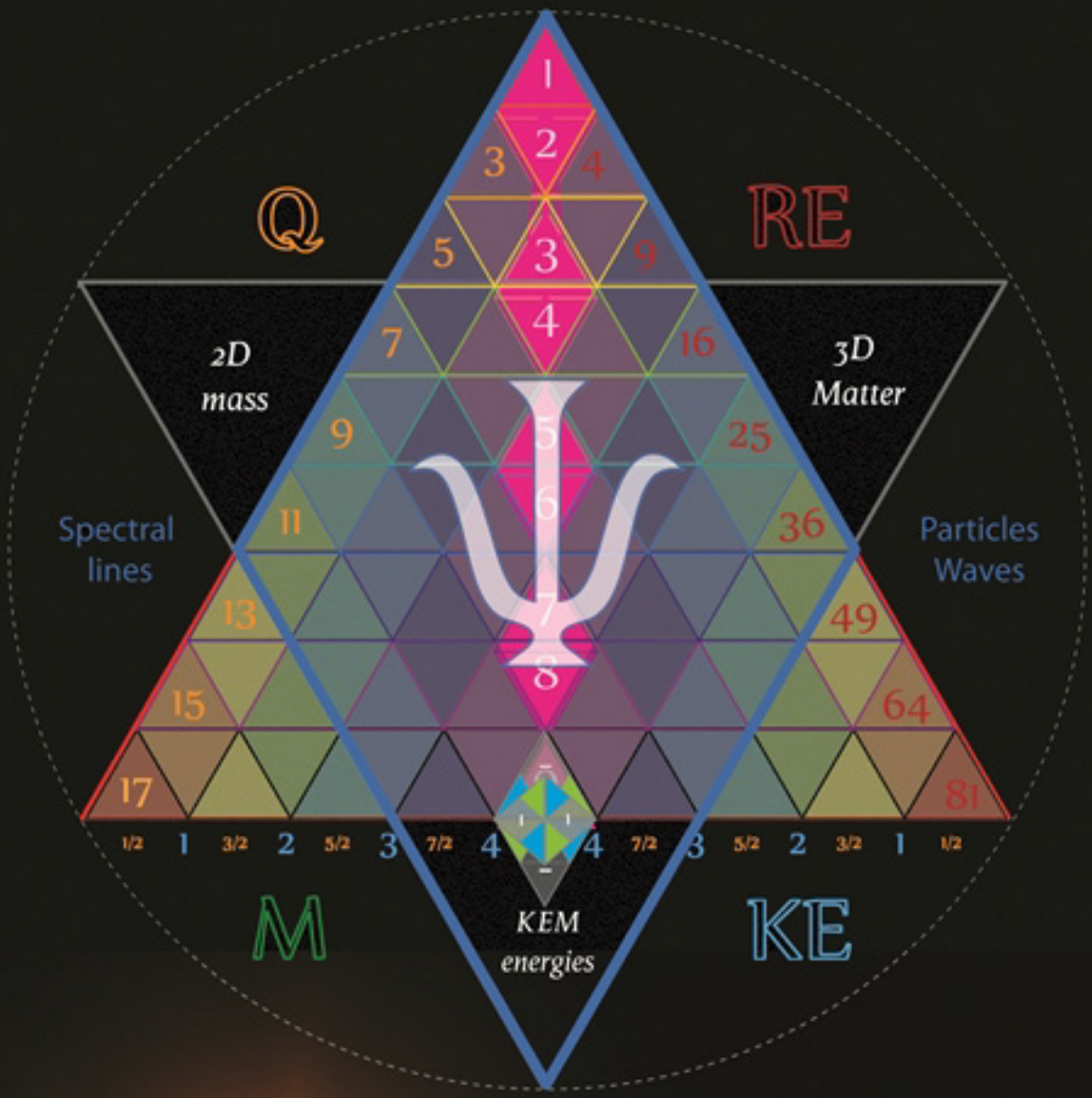
TETRYONICS

The charged geometry of mass-ENERGY-Matter in motion



Foundational Quantum Electrodynamics

Abraham

ISBN 978-0-987288-2-4
[Second Edition © 2012]

James Clerk Maxwell

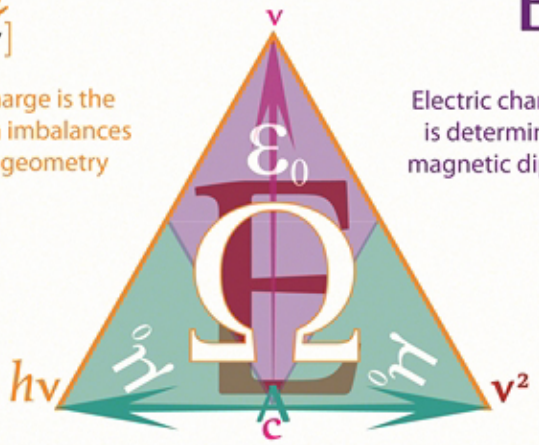
(13 June 1831 – 5 November 1879)

Maxwell's equations describe how Electric and Magnetic fields are generated and altered by each other and by charges and currents.

Q [v-v]

Net Electric charge is the result of quanta imbalances in equilateral geometry

EM Planck Energy



ORTHOGONAL MAGNETIC DIPOLE FIELD

E

Electric charge polarity is determined by the magnetic dipole vector

$$\oint \vec{E}\cdot d\vec{A} = \frac{q}{\varepsilon_0}$$ Gauss's Law for Electricity

$$\oint \vec{B}\cdot d\vec{A} = 0$$ Gauss's Law for Magnetism

$$\oint \vec{E}\cdot d\vec{s} = \frac{-d\Phi_B}{dt}$$ Faraday's Law

$$\oint \vec{B}\cdot d\vec{s} = \mu_0 i + \frac{\mu_0 \varepsilon_0 d\Phi_E}{dt}$$ Ampere's Law

E = electric field
A = area
q = charge
ε_0 = permittivity of free space (a constant)
B = magnetic field intensity
s = path length
Φ_B = magnetic flux
Φ_E = electric flux
t = time
μ_0 = permeability of free space (a constant)
i = current electric charge
$\mu_0\varepsilon_0$ = $1/c^2$, where c=speed of light

ElectroMagnetic fields in turn provide the foundation of our modern electrical and communications technologies.

Maxwell's Equations

Maxwell's equations are a set of partial differential equations that, together with the Lorentz force law, form the foundation of classical electrodynamics, classical optics, and electric circuits.

q [1-0]

POSITIVE [Ω] CHARGE

Q

Gauss' Law of Electric Flux

Electric fields diverge from Electric charge, and produce the Coulomb force,

Q

N

Gauss' Law of Zero Nett Magnetism

there are no isolated Magnetic poles, but the Henry force acts between the poles of a magnet,

S

ε_0

Faraday's Law of Inductance

Electric fields are produced by changing Magnetic fields,

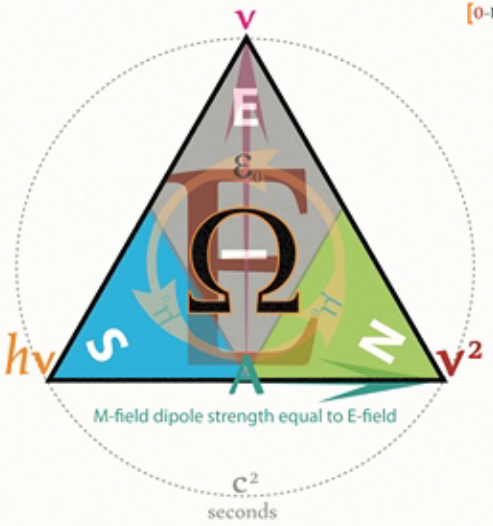
μ_0

Ampere's Circuital Law

circulating Magnetic fields are produced by moving Electric fields and by electric currents.

NEGATIVE [Ω] CHARGE

q [0-1]



Gauss' Laws

- Gauss' Law of Electric Flux and
- Gauss' Law of Magnetic dipoles

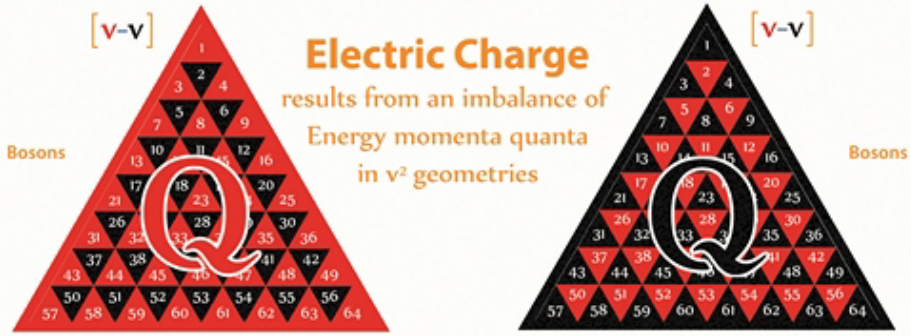
The laws were formulated by Carl Friedrich Gauss in 1835, but was not published until 1867.

They form two of Maxwell's equations which are the basis of classical electrodynamics.

The other two being:
- Faraday's law of induction, and
- Ampère's law with Maxwell's correction.

Gauss's law can be used to derive Coulomb's law, and vice versa.

Equilateral triangles are the foundational charge geometry of EM mass-Energy and Matter



Carl Friedrich Gauss

(30 April 1777 – 23 February 1855)

Integral form

$$\oint \vec{E} \cdot d\vec{A} = \frac{q}{\varepsilon_0} = 4\pi k q$$

Differential form

$$\nabla \cdot E = \frac{\rho}{\varepsilon_0} = 4\pi k \rho$$

Electric fields are divergent from their source

Although originally envisaged as a property applied to spherical geometries and usually illustrated with square sectional boundaries integrating a surface area

$$\Phi = EA = E4\pi r^2 = \frac{Q}{\varepsilon_0}$$

Charge is shown to be the result of the symmetry of equilateral quantised angular momenta

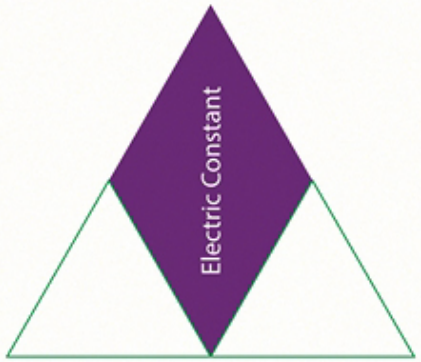
Integral form

$$\oint \vec{B} \cdot d\vec{A} = 0$$

Differential form

$$\nabla \cdot B = 0$$

There are NO Magnetic Monopoles



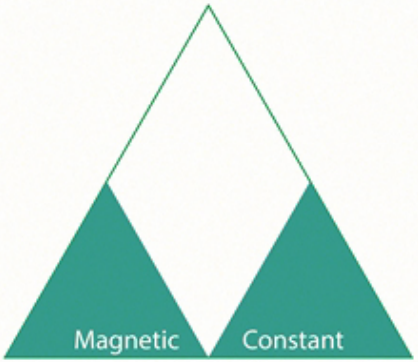
$$\varepsilon_0 = 8.85418785\text{e-}12 \ \frac{F}{m}$$

$$\oint \vec{E} \cdot d\vec{A} = \frac{q}{\varepsilon_0}$$

[v-v]

$$\oint \vec{B} \cdot d\vec{A} = 0$$

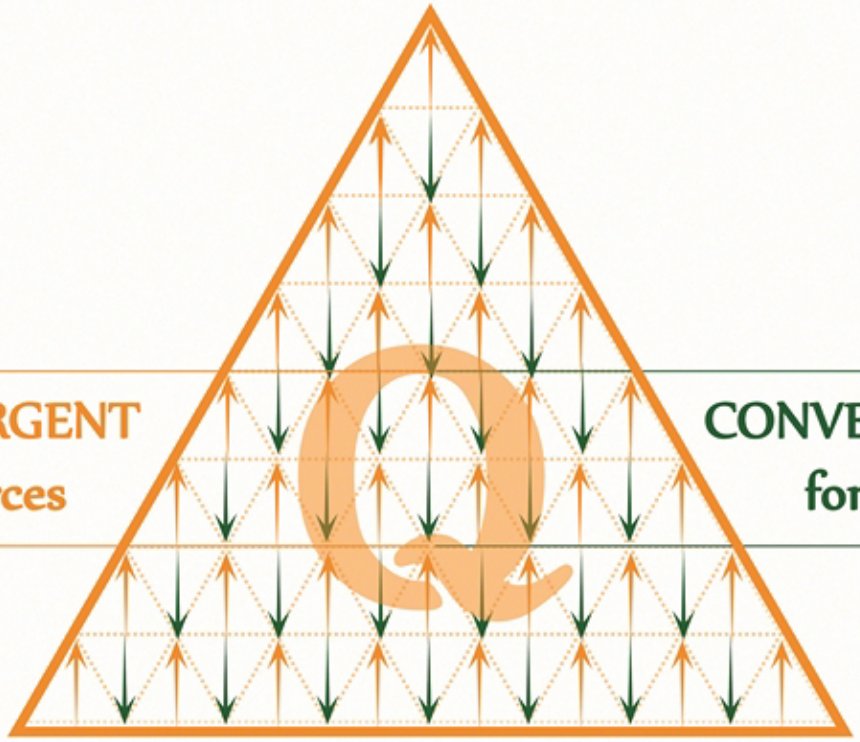
The electric flux through any closed surface is proportional to the enclosed electric charge



$$\mu_0 = 1.25663706\text{e-}6 \ \frac{H}{m}$$

The Divergent force of Charge

[v-v]



DIVERGENT forces

CONVERGENT forces

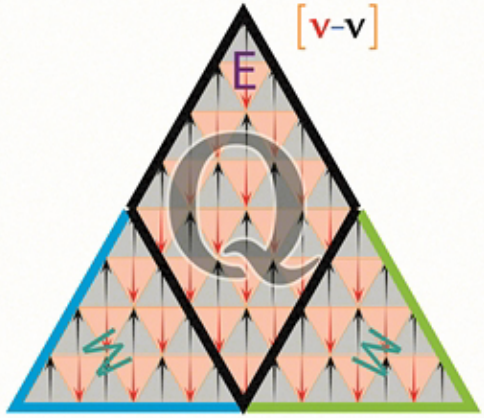
[v-v]

Charged EM fields create a net DIVERGENT force
as a result of their outward radiant energy momenta

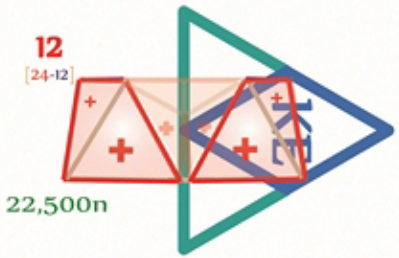
but still possess CONVERGENT forces as a result of
their inherent equilateral energy momentum symmetries

Where these radiant charged fields diverge from their source
and overlap their superpositional energy momenta
create the forces of the Law of Interaction

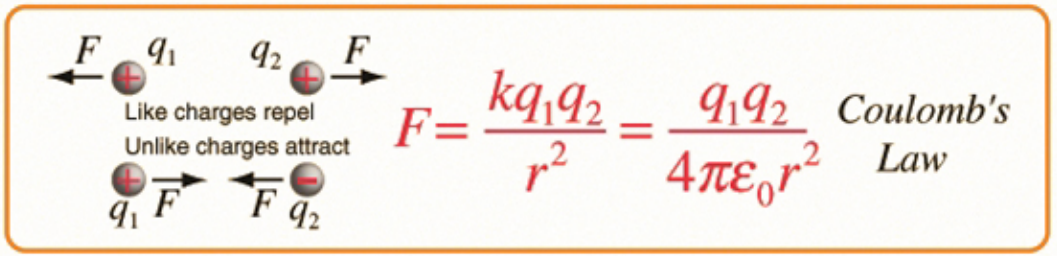
[v-v]

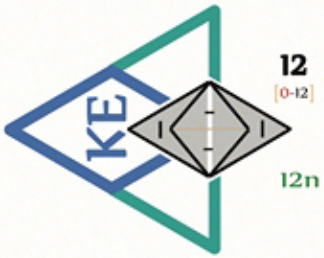


Coulomb's Law



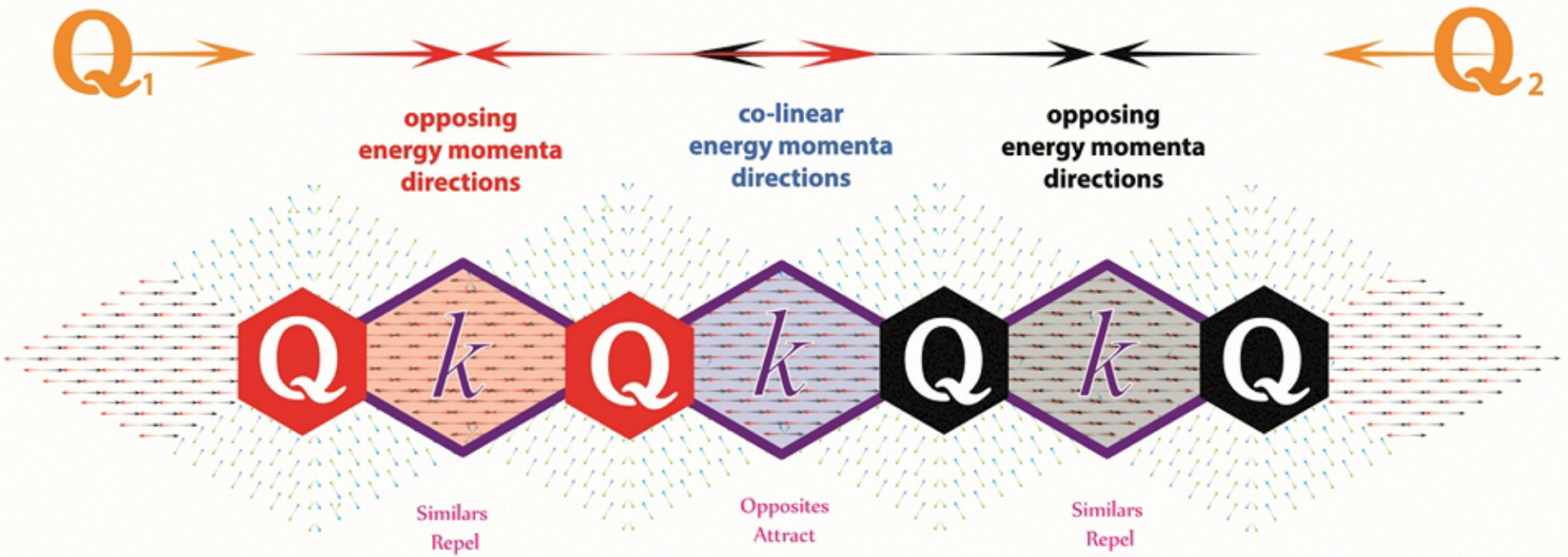
Proton



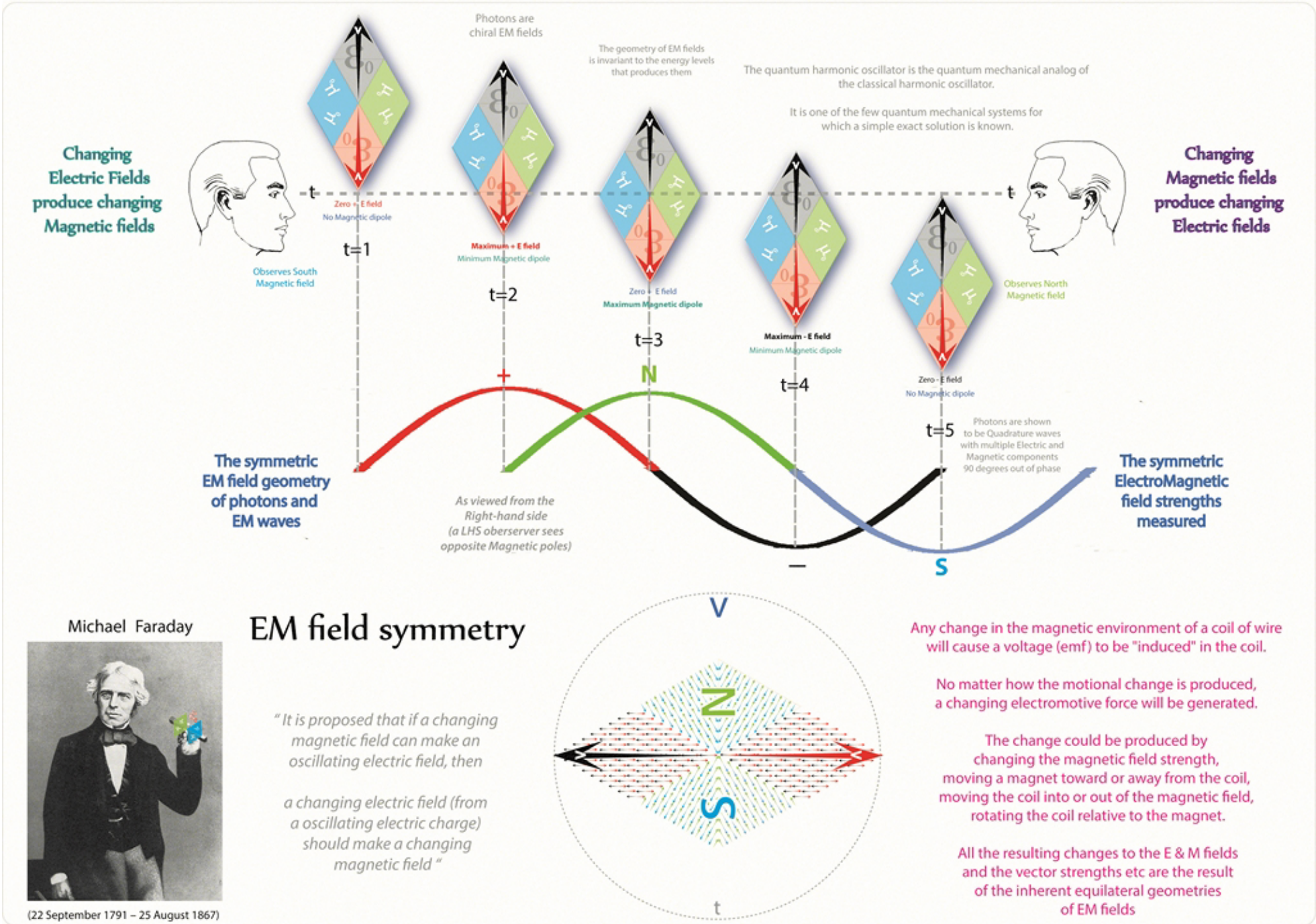


Electron

The magnitude of the electrostatic force between two point electric charges
is directly proportional to the product of the magnitudes of each of the charges
and inversely proportional to the square of the distance between the two charges.



The law of Interaction



Michael Faraday

(22 September 1791 – 25 August 1867)

EM field symmetry

" It is proposed that if a changing magnetic field can make an oscillating electric field, then

a changing electric field (from a oscillating electric charge) should make a changing magnetic field "

Any change in the magnetic environment of a coil of wire will cause a voltage (emf) to be "induced" in the coil.

No matter how the motional change is produced, a changing electromotive force will be generated.

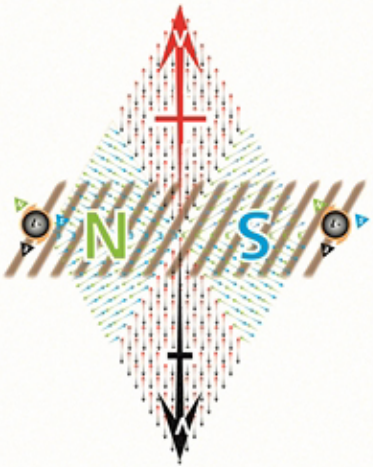
The change could be produced by changing the magnetic field strength, moving a magnet toward or away from the coil, moving the coil into or out of the magnetic field, rotating the coil relative to the magnet.

All the resulting changes to the E & M fields and the vector strengths etc are the result of the inherent equilateral geometries of EM fields

Electromagnetic Induction

All ElectroMagnetic circuits are comprised of quantum inductive fields [ZPFs] and energies that obey Newton's third law and the conservation of energy

EM field coupling



Electromagnetic induction is the production of an electric current across a conductor moving through a magnetic field.
It underlies the operation of generators, transformers, induction motors, electric motors, synchronous motors, and solenoids.

$$|\mathcal{E}| = \left|\frac{d\Phi_B}{dt}\right|$$

Michael Faraday formulated that electromotive force (EMF) produced around a closed path is proportional to the rate of change of the magnetic flux through any surface bounded by that path.

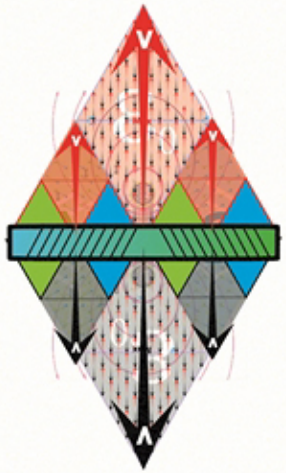
$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

$$V_{\mathrm{P}} = N_{\mathrm{P}}\frac{\mathrm{d}\Phi}{\mathrm{d}t}.$$

For the special case of a coil of wire, or a transformer circuit composed of N loops with the same area, Faraday's general equation becomes

$$V_{\mathrm{s}} = N_{\mathrm{s}}\frac{\mathrm{d}\Phi}{\mathrm{d}t},$$

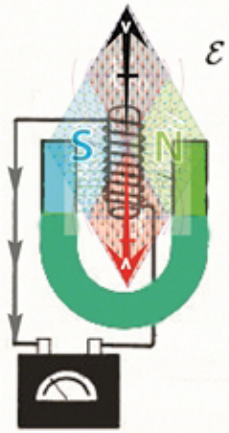
Inductive Coupling

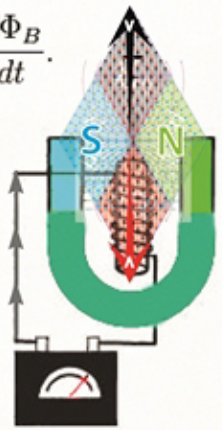


A corollary of Faraday's Law, together with Ampère's law and Ohm's law is Lenz's law:
The EMF induced in an electric circuit always acts in such a direction that the current it drives around the circuit opposes the change in magnetic flux which produces the EMF

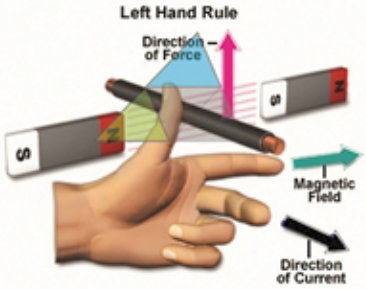
$$\mathcal{E} = -N\frac{d\Phi_B}{dt}.$$

Coil moves UP





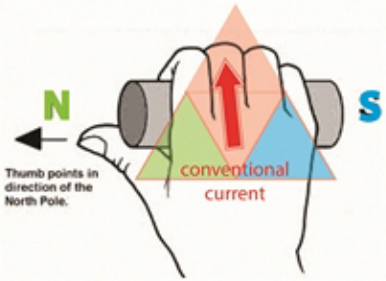
Coil moves DOWN



Fleming's left hand rule
(for electric motors)

An electric current passes through a solenoid, resulting in a magnetic field. When you wrap your right hand around the solenoid with your fingers in the direction of the conventional current, your thumb points in the direction of the magnetic north pole.

An electric current passes through a straight wire. Here, the thumb points in the direction of the conventional current (from positive to negative), and the fingers point in the direction of the magnetic lines of flux.



Fleming's right hand rule
(for EM induction)

Faraday's Law of Induction

Michael Faraday

(22 September 1791 – 25 August 1867)

Electromagnetic induction is the production of a potential difference (voltage) across a conductor when it is exposed to a varying magnetic field.

In the frame of a conductor moving relative to the magnet, charged particles in the conductor experience a coulombic force due to the neutralised electric fields of the permanent magnet.

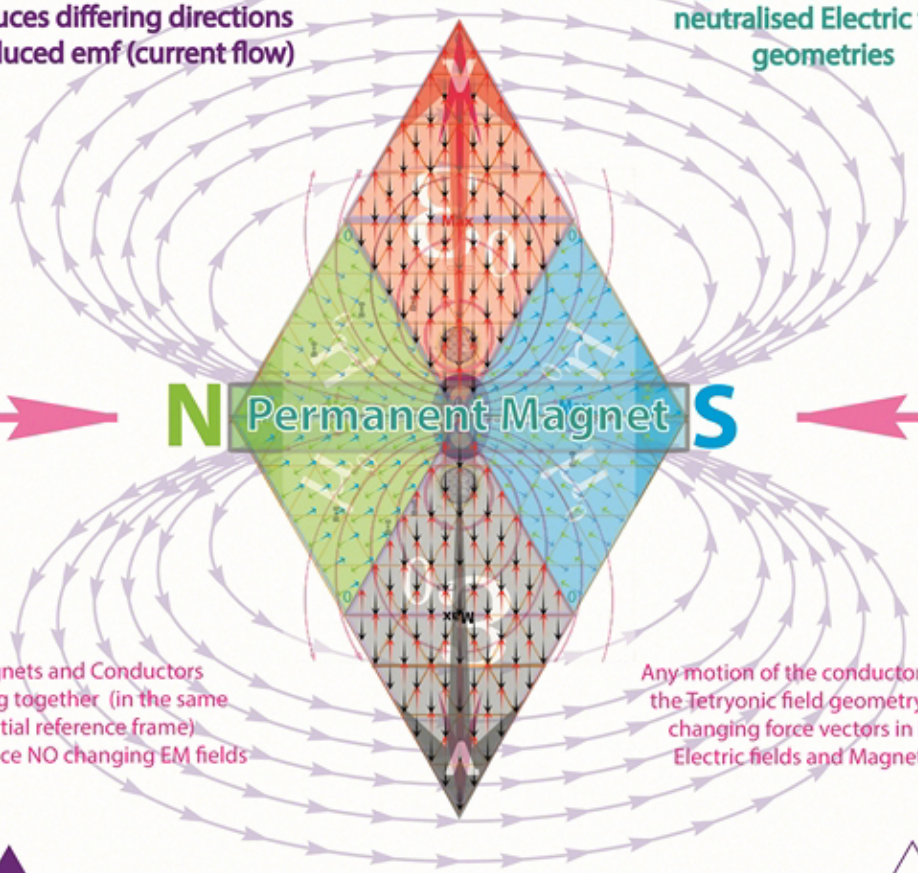
Faraday's law states that:
The induced electromotive force (emf) in any closed circuit is equal to the time rate of change of the magnetic flux through the circuit.

$$\oint \vec{E} \cdot \vec{ds} = -\frac{d\Phi_B}{dt}$$

The motion of EM fields creates an induced motion in external fields and particles

The linear energy momenta of the neutralised E-fields produces differing directions of induced emf (current flow)

A permanent magnet has a static Magnetic dipole field and neutralised Electric field geometries



Inductive loop

Charged particles in the conductor are subject to voltage emfs

Inductive loop

Charged particles in the conductor are subject to voltage emfs

Magnets and Conductors moving together (in the same inertial reference frame) experience NO changing EM fields

Any motion of the conductor relative to the Tetryonic field geometry produces changing force vectors in both the Electric fields and Magnetic fields

An Electrostatic (charged) particle has Electric fields of a particular polarity and neutralised Magnetic fields

It is impossible (due to the geometry of EM fields) to move either the permanent Magnet or the Conductor without producing variations in the Electric and Magnetic fields

A Magneto-static body of Matter has a dipolar Magnetic field and neutralised Electric fields

Ampere's Law

In classical electromagnetism, Ampère's circuital law, relates the integrated magnetic field around a closed loop to the electric current passing through the loop.

Q

[v-v]

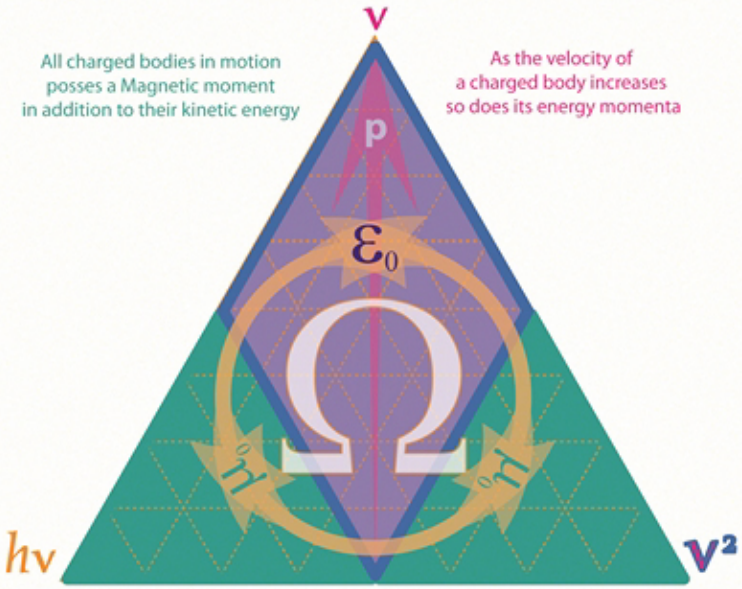
All energy momenta quanta have equilateral geometries, [quantised angular momenta [Ω]] that can be modelled as a continuous steady current within a closed inductive loop

$$\oint \vec{B} \cdot \vec{ds} = \mu_0 i + \frac{1}{c^2} \frac{\partial}{\partial t} \int \vec{E} \cdot d\vec{A}$$

The nett Charge of any particle or surface is the result of the quantised equilateral energy momenta symmetries of its integral surface area

All charged bodies in motion posses a Magnetic moment in addition to their kinetic energy

As the velocity of a charged body increases so does its energy momenta



Andre Ampere

(20 January 1775 – 10 June 1836)

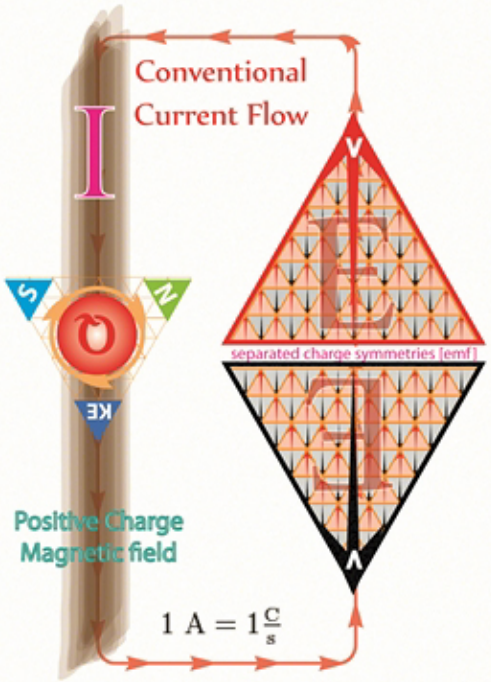
Ampere's law relates magnetic fields to the electric currents that produce them.

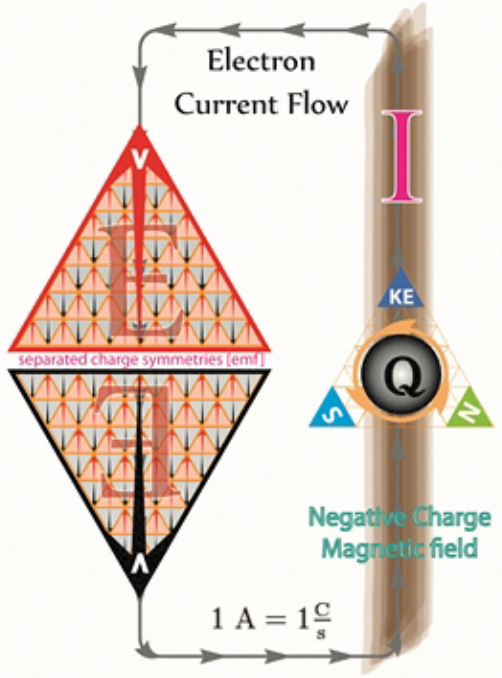
$$\oint_C \mathbf{B} \cdot \mathrm{d}\boldsymbol{\ell} = \mu_0 I_{\mathrm{enc}}$$

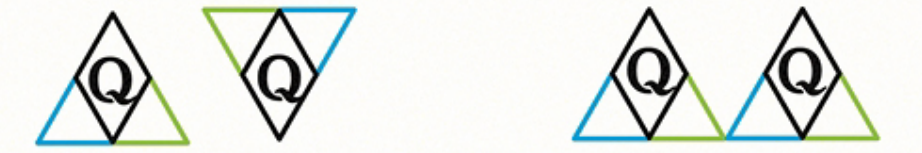
$$\mathbf{J_f} + \mathbf{J_D} + \mathbf{J_M} = \mathbf{J_f} + \mathbf{J_P} + \mathbf{J_M} + \varepsilon_0 \frac{\partial \mathbf{E}}{\partial t} = \mathbf{J} + \varepsilon_0 \frac{\partial \mathbf{E}}{\partial t},$$

With the addition of Maxwell's Displacement current to account for time varying electric fields without a physical flow of charged Matter the way forward is paved for Planck, Lorentz and Tetryonics

The Closed circuit or loop can be any geometric shape with Tetryonics dictating equilateral [triangular] Planck energies & quantum charge geometries with Tetrahedral geometries for Matter quanta

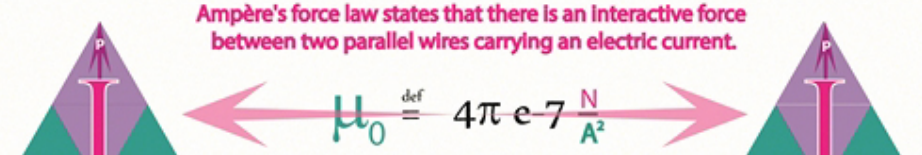






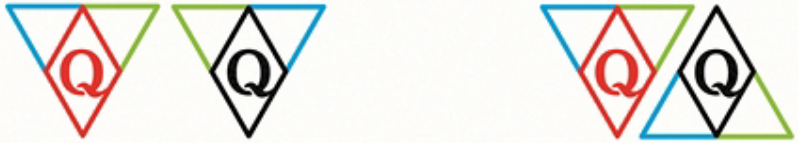
$$F = 2k_A \frac{I_1 I_2}{r}$$

Ampère's force law states that there is an interactive force between two parallel wires carrying an electric current.



$$\mu_0 \overset{\text{def}}{=} 4\pi \, e{-}7 \, \frac{N}{A^2}$$

This force is used in the formal definition of the ampere which states that it is "the constant current which will produce an attractive force of 2 × 10−7 newtons per metre of length between two straight, parallel conductors of infinite length and negligible circular cross section placed one metre apart in a vacuum"

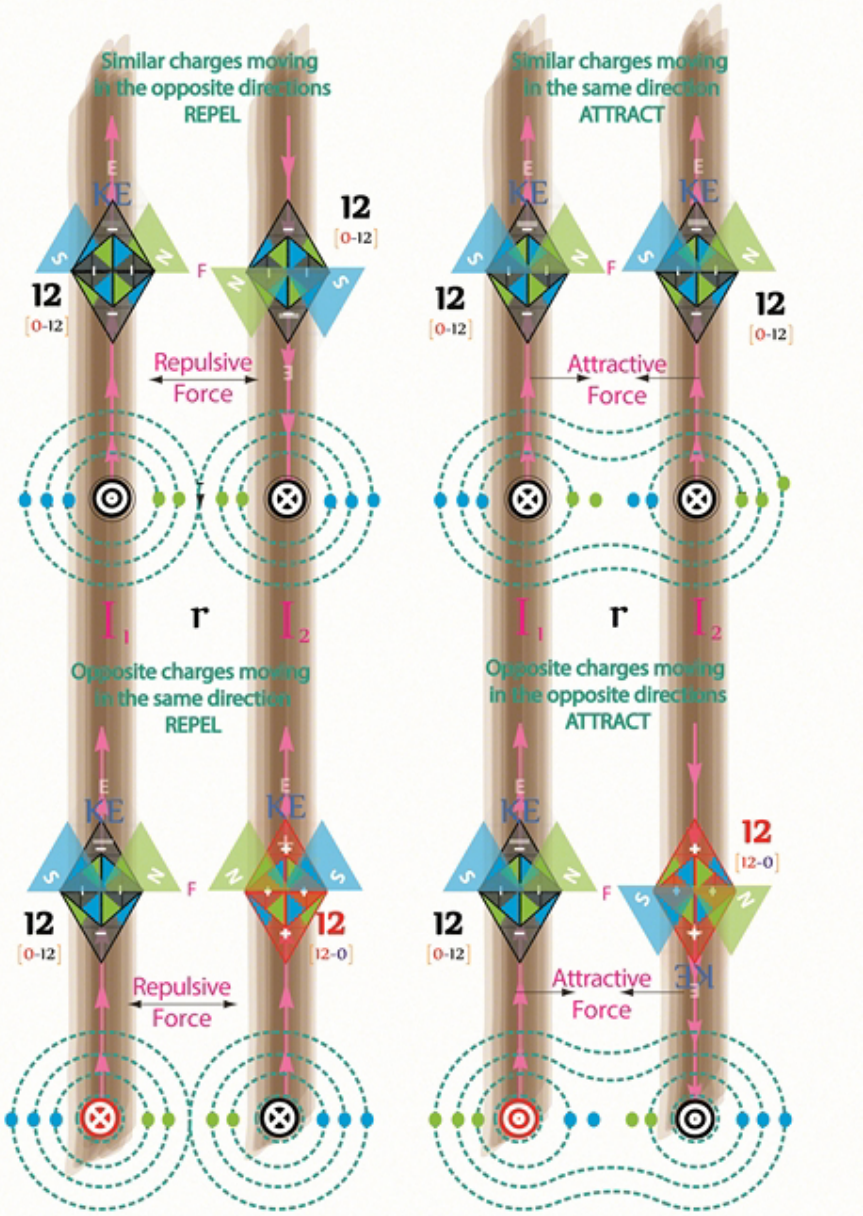


These attractions and repulsions between electric currents differ fundamentally from the effects produced by electricity in repose. First, they cease, as chemical decompositions do, as soon as we break the circuit. Second, in ordinary electric attractions and repulsions, opposite charges attract, and like charges repel; in the attractions and repulsions of electric currents, we have precisely the contrary; it is when the two conducting wires are placed parallel in such a way that their ends of the same sign are next to each other that there is attraction, and there is repulsion when the ends of the same sign are as far apart as possible. Third, in the case of attraction, when it is sufficiently strong to bring the movable conductor into contact with the fixed conductor, they remain attached to one another like two magnets, and do not separate after a while, as happens when two conducting bodies, oppositely electrified, come to touch.

André Marie Ampère (1775 - 1836)

Figure 3

$$1\ \text{A} = 1\frac{\text{C}}{\text{s}}$$



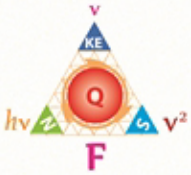
ElectroMotive exchange particles

W

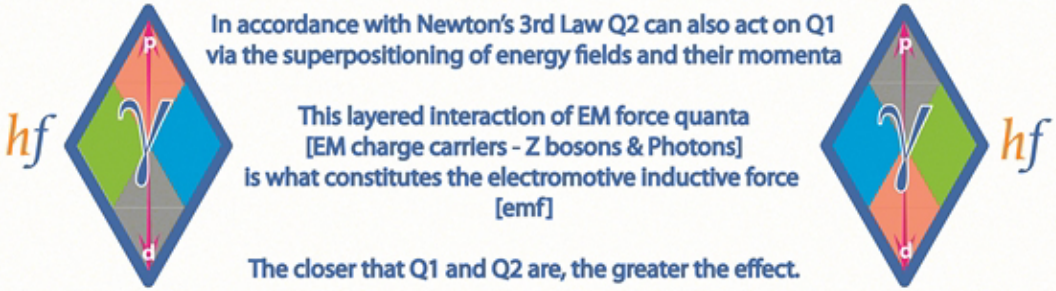
All four of the fundamental forces involve the exchange of ODD numbers of electromagnetic charge bosons so as to transfer discrete energy momenta between separated Matter

KEM field energy momenta attracts opposite charges

In ElectroMagnetic field or circuits, when charged Matter moves along electric field lines, electrical work is done on them by the electromotive force, whether it involves storing potential energy (negative work) or increasing kinetic energy (positive work)



In accordance with Newton's 3rd Law Q2 can also act on Q1 via the superpositioning of energy fields and their momenta



This layered interaction of EM force quanta [EM charge carriers - Z bosons & Photons] is what constitutes the electromotive inductive force [emf]

The closer that Q1 and Q2 are, the greater the effect.

γ

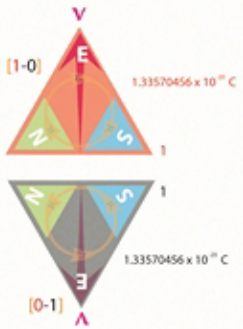
The EM exchange force denotes a force produced by the exchange of force carrier particles, such as the electromagnetic force produced by the exchange of photons between electrons

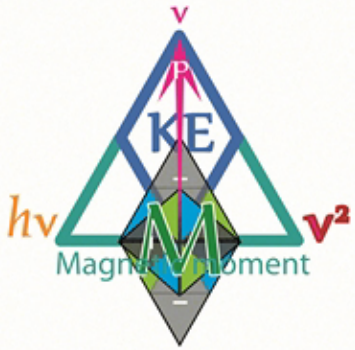
KEM field energy momenta repels same charge particles

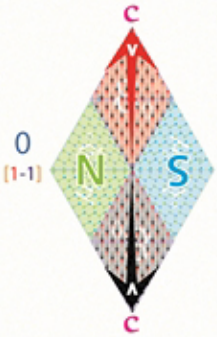
Bosons

$$1\pi \text{ Charge } \left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field — Planck quanta — ElectroMagnetic — mass — velocity





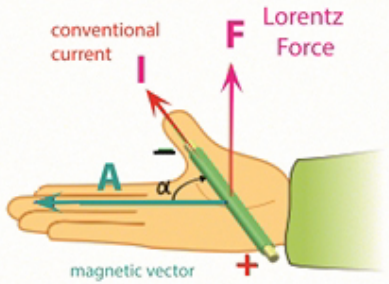


Photons

$$2\pi \text{ Photons } \left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field — Planck quanta — ElectroMagnetic — mass — velocity

Lorentz Force

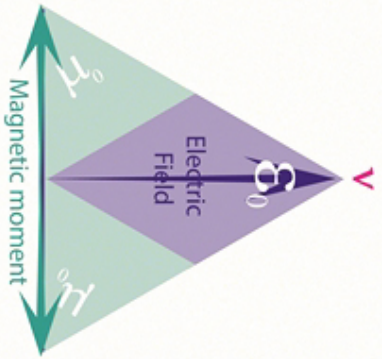


In physics, the Lorentz force is the force on a point charge due to electromagnetic fields.

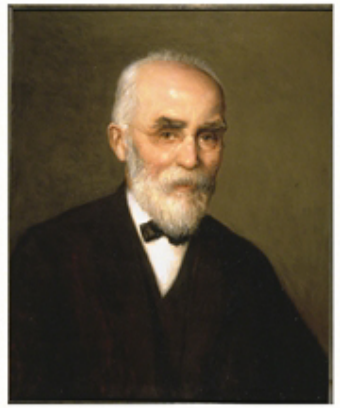
It is given by the following equation in terms of the electric and magnetic fields

The magnetic force component of the Lorentz force manifests itself as the force that acts on a current-carrying wire in a magnetic field.

In that context, it is also called the Laplace force.



Hendrik Lorentz

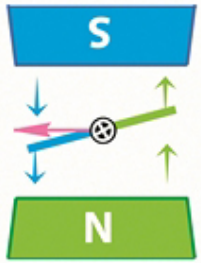


(18 July 1853 – 4 February 1928)

$$\vec{F} = q\vec{E} + q\vec{v} \times B$$

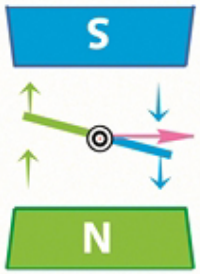
LORENTZ force = *Electric force* + *charge velocity* x *Magnetic force*

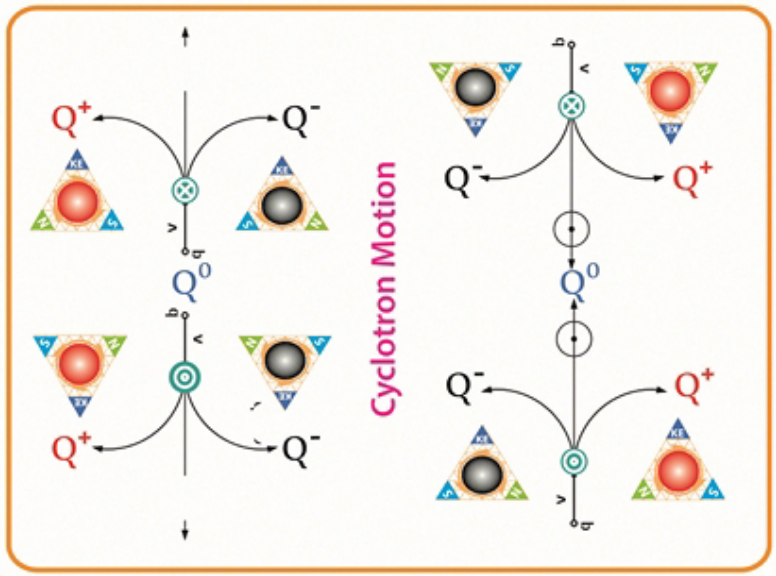
Magnetic fields created by moving charges are perpendicular to the direction of motion (and can do NO work)



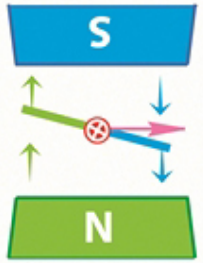
Negative Charges

Q

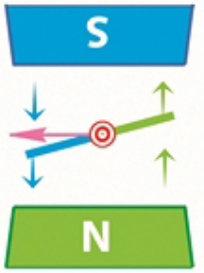




Up out of page ⊙ Magnetic Field ⊗ Down into page



Positive Charges



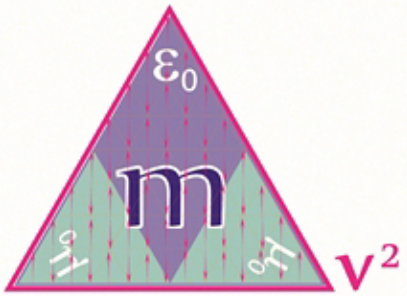
Q

Work - Force - Energy

Work is the result of energy-momenta transfer (by means other than Matter-transfer), and produces changes in the second system's nett energy-momenta

Work

refers to an activity involving a force and movement in the directon of the force



Work

$$W = F.d = ma.d = E$$

The Planck constant is the quantum of Action

$$kg\,\frac{m}{s^2}\,m$$

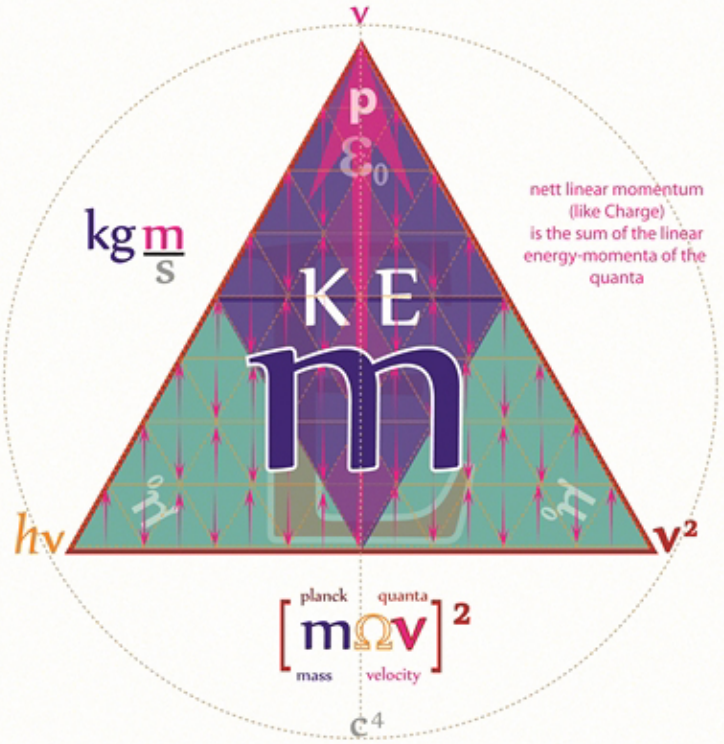
Mechanical work is a scalar quantity that can be described as the product of a force times the distance through which it acts

[Force per meter]

Force

$$ma = \frac{\Delta p}{\Delta t} = \Delta\left[\frac{mv}{t}\right] \qquad kg\,\frac{m}{s^2}$$

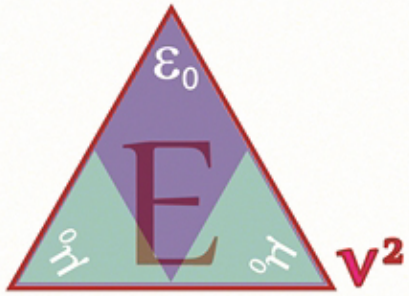
Momentum is the quantum of Force



Power is defined as the rate of using Energy or the rate of doing work

Energy

is the scalar capacity to do work
You must have energy to accomplish work



Energy

$$E = mv^2 = hv^2$$

Energy is the square of Momentum

$$kg\,\frac{m^2}{s^2}$$

Energy is always equivalent to the ability to exert pulls or pushes against the basic forces of nature, along a path of a certain length.

[mass-energy momentum squared]

Watts
[Joules per second]

WORK

Force per second

In Classical Mechanics

One watt is the rate at which work is done when an object's velocity is held constant at one meter per second against constant opposing force of one newton.

James Watt

(19 January 1736 – 25 August 1819)

POWER

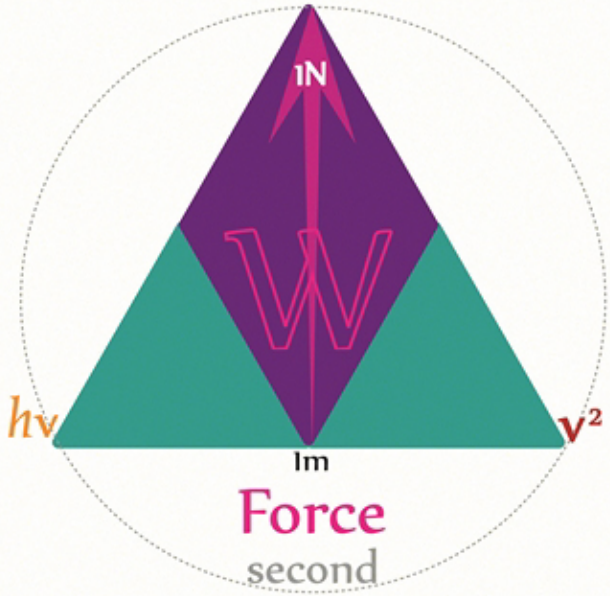
Energy per second

In ElectroDynamics

One watt is the rate at which work is done when one ampere (A) of current flows through an electrical potential difference of one volt (V).

Work in physics is measured in Joules

Nm/s



The watt second is a unit of energy, equal to the joule

$$W = \frac{J}{s} = \frac{N \cdot m}{s} = \frac{kg \cdot m^2}{s^3}$$

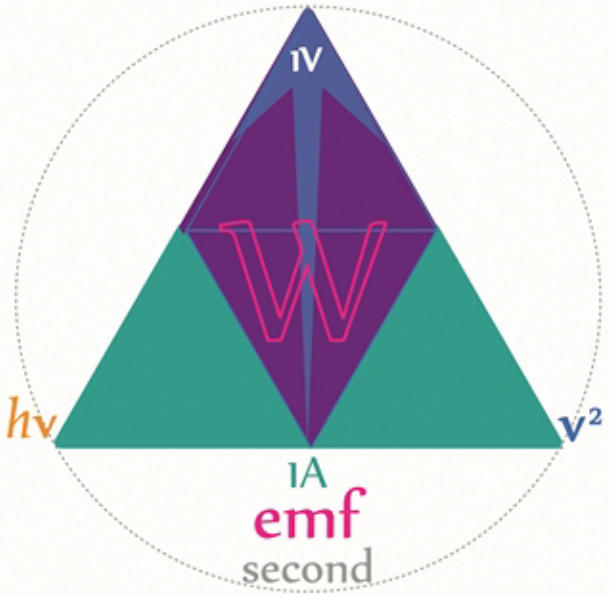
One Watt, defined as one joule per second, measures the rate of energy conversion.

$$W = V.A$$

Energy / second
[Joules/sec]

Electrical power is measured in Watts

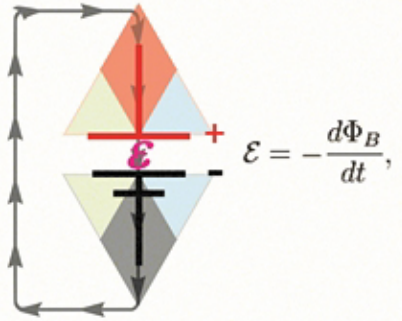
J/s



The electromotive Force

The electromotive force, or most commonly emf (seldom capitalized), or (occasionally) electromotance is "that which tends to cause current (actual electrons and ions) to flow.

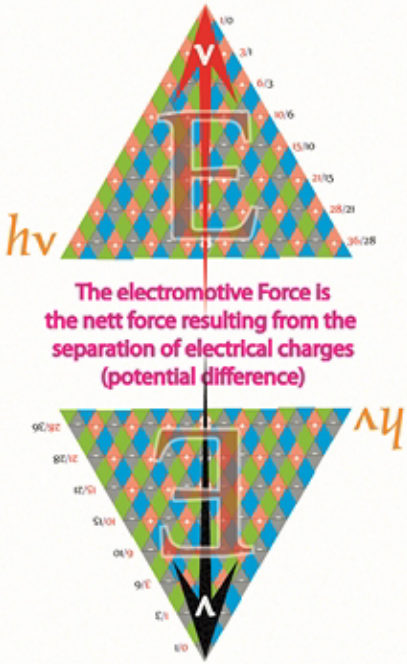
A conductor creates a circuit between the 'Quantum potentials' allowing charges to seek an eqilibrium (current flow)



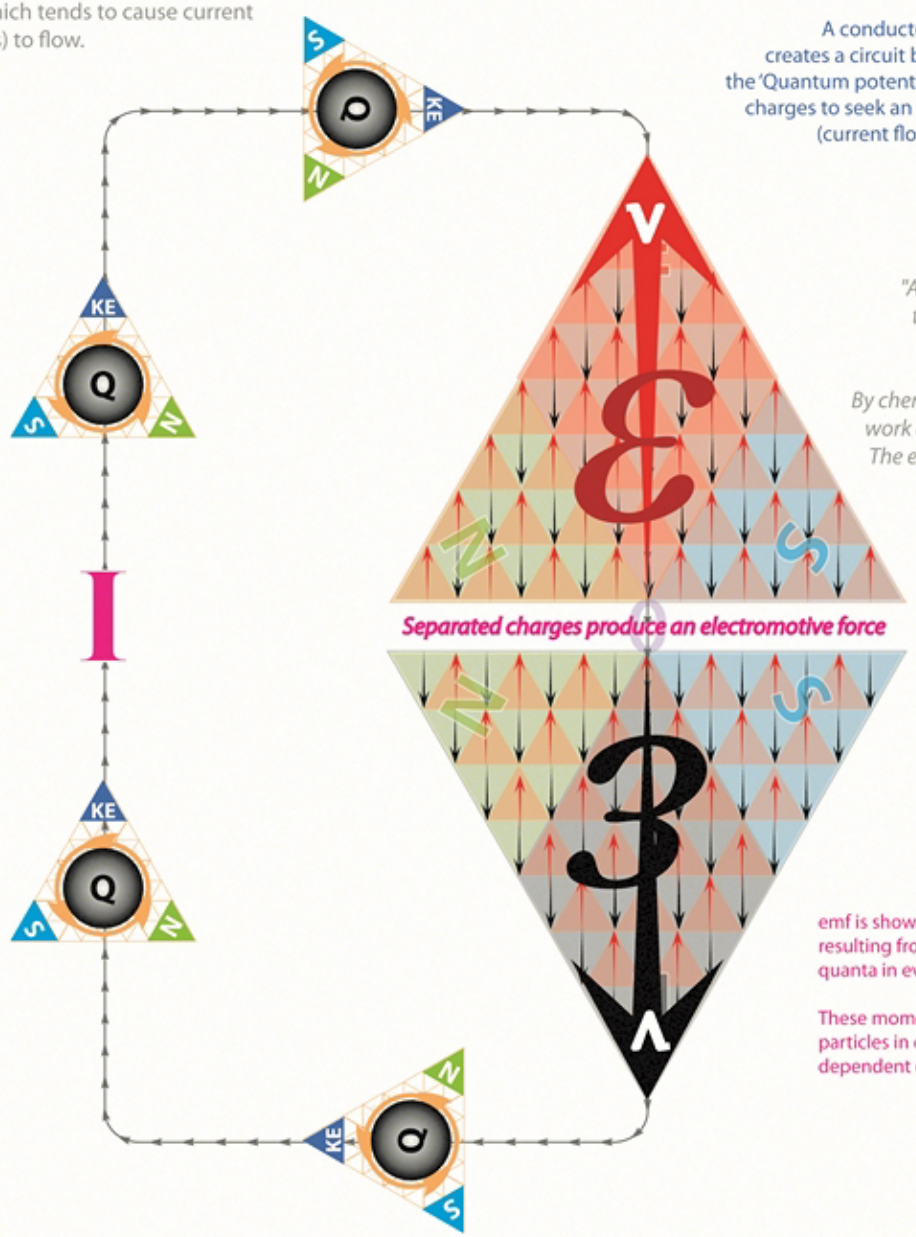
"A source emf can be thought of as a kind of charge pump that acts to move charge from a point of high potential through its interior to a point of opposite potential. …

By chemical, mechanical or other means, the source of emf performs work dW on that charge to move it to the high potential terminal. The emf of the source is defined as the work dW done per charge dq: = dW/dq."

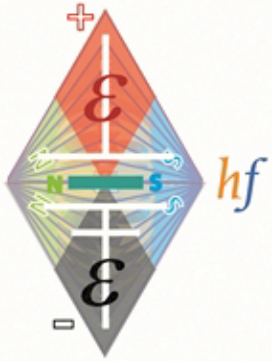
Electric Fields contain bi-directional energy-momenta



The electromotive Force is the nett force resulting from the separation of electrical charges (potential difference)



A Magnet stores charge quanta (bosons) in static Electro-Magnetic fields that in turn produce a Magnetic dipole



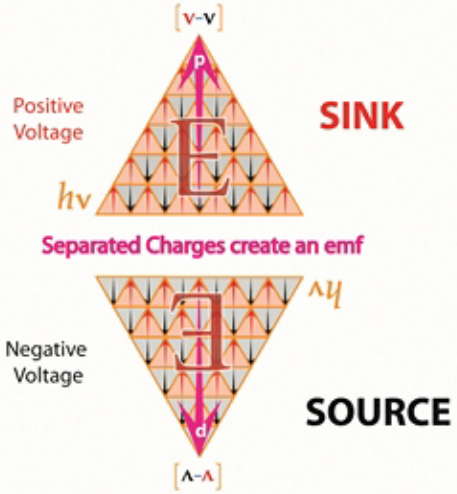
emf is shown to be the nett force resulting from the linear momenta quanta in every Electric 'voltage' field

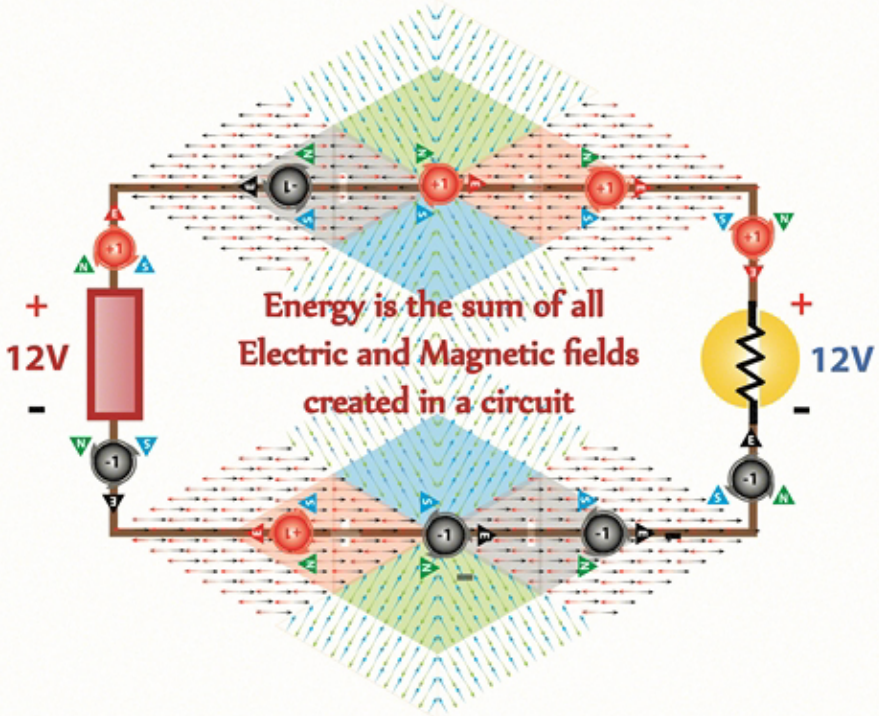
These momenta accelerate charged particles in one of two directions dependent of the particle's nett charge

A Magnet can be viewed as a neutralised quantum emf source

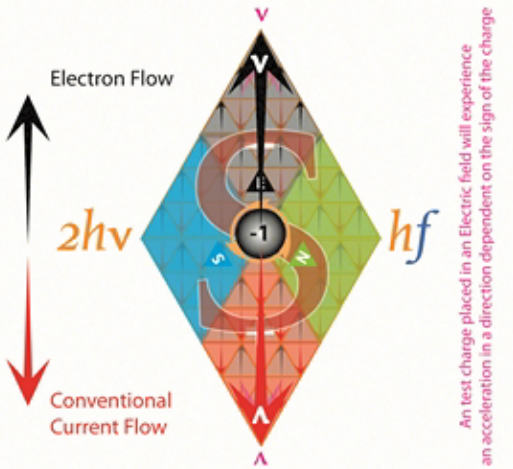
All Charges seek Equilibrium

Poynting Vectors





Poynting Field



John Henry Poynting

(9 September 1852 – 30 March 1914)

Electrical energy is transferred along a conductive path in an electrical circuit accelerating charged particles and ions in turn imbuing them with Kinetic Energy [voltage leads current]

There is an electric field running down the middle of the wire, which extends to just beyond its surface.

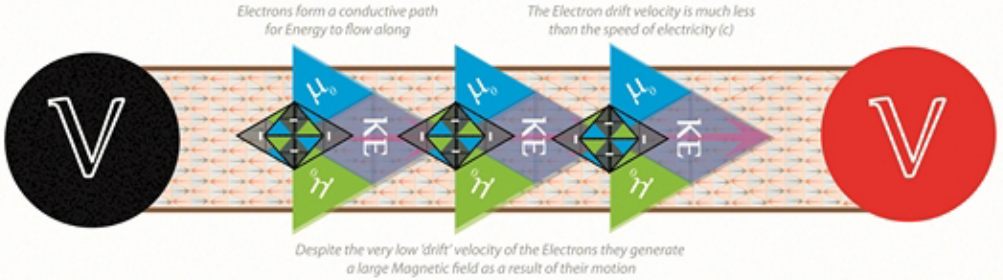
This electric field pushes the charges along against the resistance and adds to the electric field caused by the surface charges. The resultant electric field changes its direction around the circuit as the wires form a loop back to the battery.

Moving charged topologies inside the wire create a secondary magnetic field geometry around the wire

Energy

$$\mathbf{S} = \mathbf{E} \times \mathbf{H}$$

momenta



Energy is transferred through empty space around (and NOT in) the wires of an electric circuit via an electromagnetic field called the Poynting field

It's important to remember that the current doesn't flow in both directions, only the energy does

Coulomb's Electric Interactions

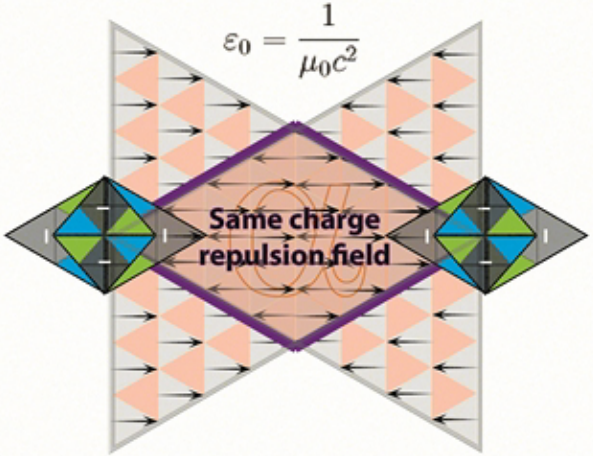
$$k = \frac{1}{4\pi\varepsilon_0}$$

The proportionality constant ke, called the Coulomb constant (sometimes called the Coulomb force constant), is related to defined properties of linear EM energy momentum and is used to define Electric field forces

$$c = \frac{1}{\sqrt{\mu_0\varepsilon_0}}$$

$$8.987\ e9\ \frac{Nm^2}{C^2}$$

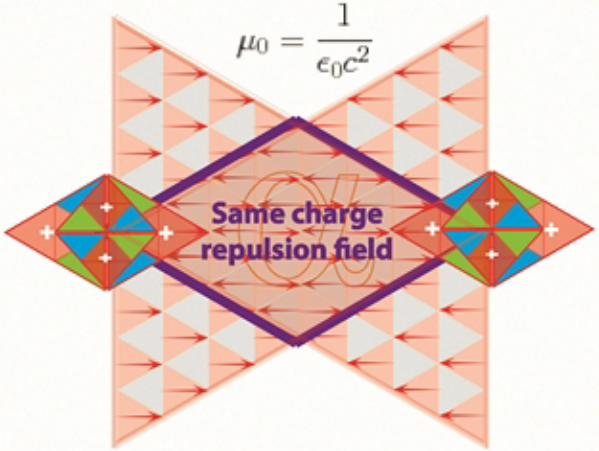
$$\varepsilon_0 = \frac{1}{\mu_0 c^2}$$



Similars repel

Opposites attract

$$\mu_0 = \frac{1}{\epsilon_0 c^2}$$



Similars repel

Linear Coulombic force interactions are a result of charged E field linear momenta

$$\mathbf{E} = \frac{\mathbf{F}}{q_t}$$

The Electric field can be defined by the Force exerted by a Charge

It is a measure of the interactive force produced by the Electric field energy-momenta of two superpositioned charge KEM fields

Longitudinal E field forces between Charged particles are mediated by Photons

$$\mathbf{E} = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}\hat{\mathbf{r}}$$

The Electric field can also be derived from Coulomb's Law

Coulomb Force

Electric fields produce Coulombic forces

$$F = k\frac{Q_1 Q_2}{r^2}$$

It is defined as the nett Charge transported by a steady current of one Ampere in one second.

C

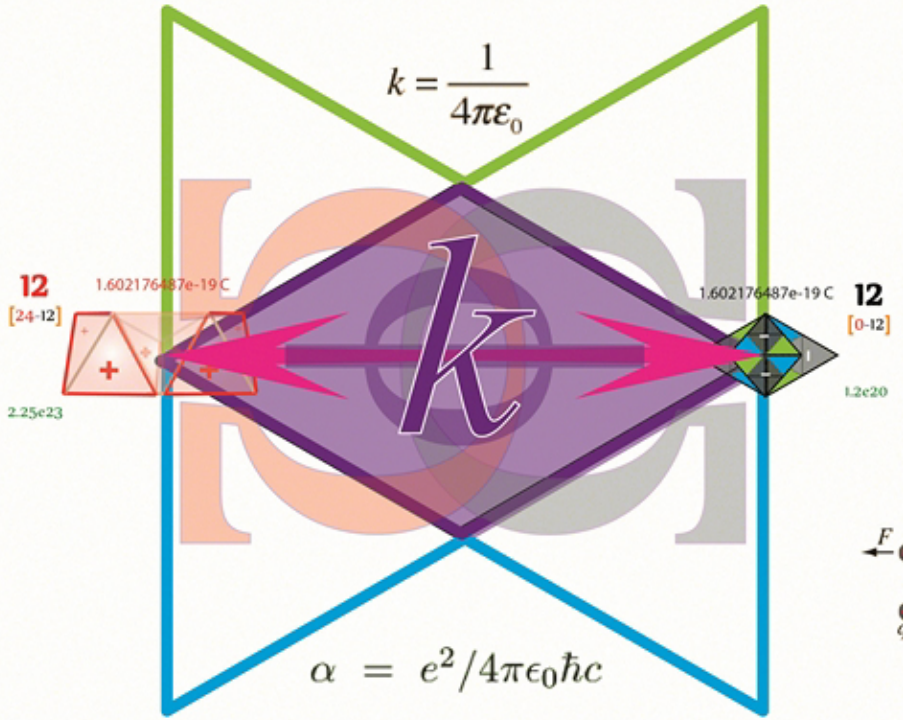
1 Coulomb of nett charge is comprised of

$(12 \times 1.335180067\ e{-}20)^{-1}$

6.240355408 e18 electrons

kg.s

$$k = \frac{1}{4\pi\varepsilon_0}$$

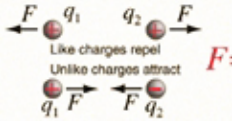


$$\alpha = e^2/4\pi\epsilon_0\hbar c$$

Charles-Augustin de Coulomb

(14 September 1736 – 23 August 1806)

Coulomb's Law is a law of physics describing the electric interaction between any two charged particles (and forms the basis for Ampere's Law)



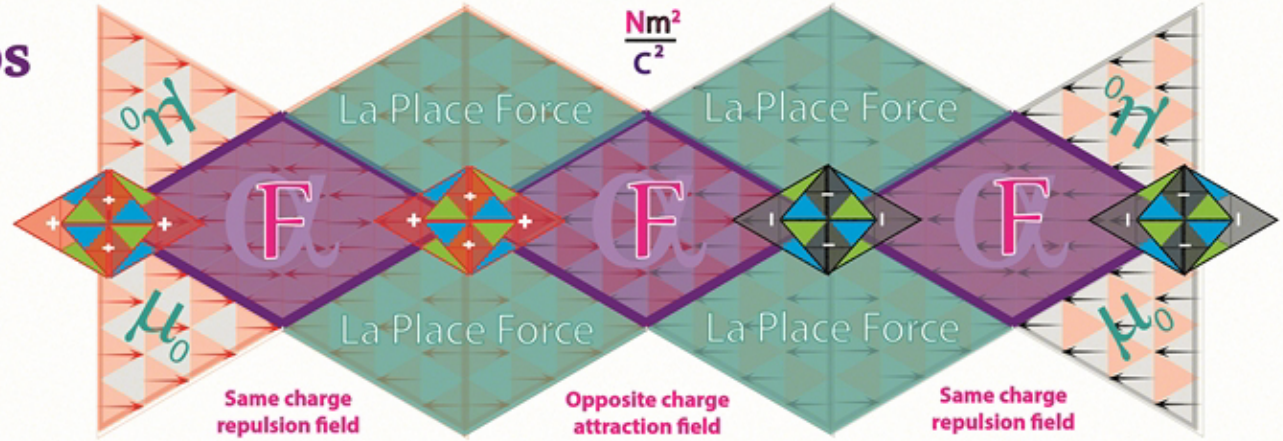
$$F = \frac{kq_1q_2}{r^2} = \frac{q_1q_2}{4\pi\varepsilon_0 r^2}$$ *Coulomb's Law*

The interactive linear momenta of super-positioned E-fields creates Coulombic forces

Coulombs

As

$1C = 1A \cdot 1s$



Amperes

$\frac{C}{s}$

$1\,A = 1\frac{C}{s}$

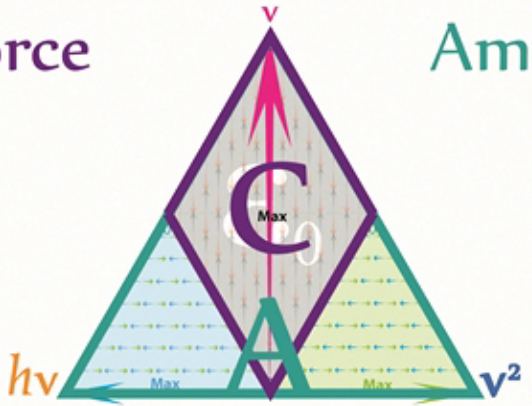
Charles-Augustin de Coulomb

(14 September 1736 – 23 August 1806)

Coulomb force

$$k_c \frac{Q_1 Q_2}{r^2}$$

As



Ampere force

$$2k_A \frac{I_1 I_2}{r}$$

$$\frac{C}{s}$$

Andre Ampere

(20 January 1775 – 10 June 1836)

Lorentz Forces

are the forces on a point charge due to external electromagnetic fields

$$\vec{F} = q[\vec{E} + (\vec{v} \times \vec{B})]$$

electric force; velocity

magnetic forces do not accelerate charged particles

Linear acceleration
Electric force
between charged particles

Q

Same charges

Q

Opposite charges

Q

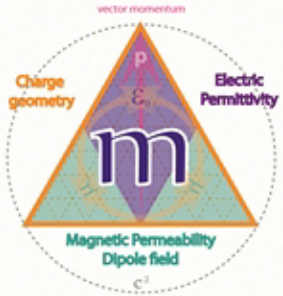
Same charges

Q

I

The amount of charged mass-Matter topologies moving passing a point per unit time

Current

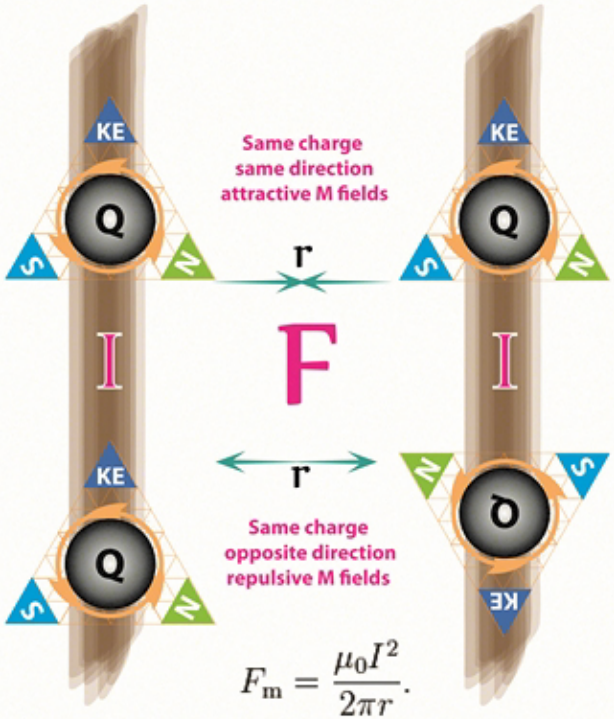


Charge

The angular mass momenta possessed by a steady current of one ampere in one second.

Q

Transverse perturbative
Magnetic force
between charged particles



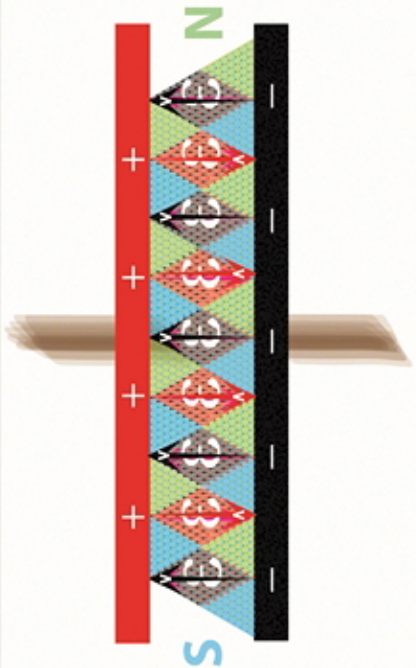
$$F_m = \frac{\mu_0 I^2}{2\pi r}.$$

Capacitance

Any two electrical conductors separated by a non-conducting (or very high resistance) medium is a capacitor
[these can be plates, conductive wires or coaxial cables etc]

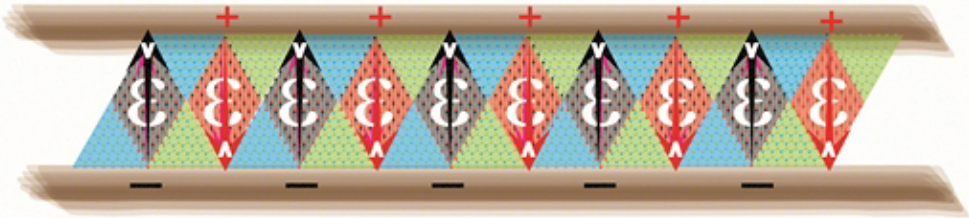
Capacitance is a function only of the physical dimensions (geometry) of conductors and the permittivity of the dielectric separating them

Plate capacitors



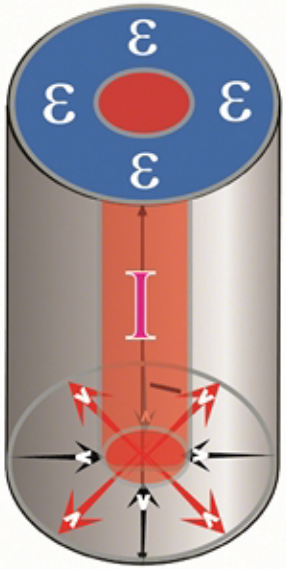
separated conductive cables

In general any separated charges will create a emf voltage



should a current flow in the conductors the capacitive field will be dominated by perpendicular, superpositioned amperian M-fields of greater strength

Coaxial cables



The SI unit of capacitance is the farad (symbol: F), named after the English physicist Michael Faraday;

Capacitance is the ability of a body to store an electrical charge.

$$C = \frac{Q}{V}$$

Any object that can be electrically charged exhibits capacitance

A 1 farad capacitor when charged with1 coulomb of electrical charge will have a potential difference of 1 volt between its plates.

Amperian Forces

Currents produce magnetic field forces

$$F = 2k_A \frac{I_1 I_2}{r}$$

6.241335 e18 electrons passing a given point per second constitutes one Ampere.

Coulombs are charged masses

m

that produce accelerations

Andre Ampere

(20 January 1775 – 10 June 1836)

Current is charged Matter in motion

M

that produce magnetic fields

A

1 Amp of electrons has a EM mass of

6.241355408 e18 x 8.851486361 e-31

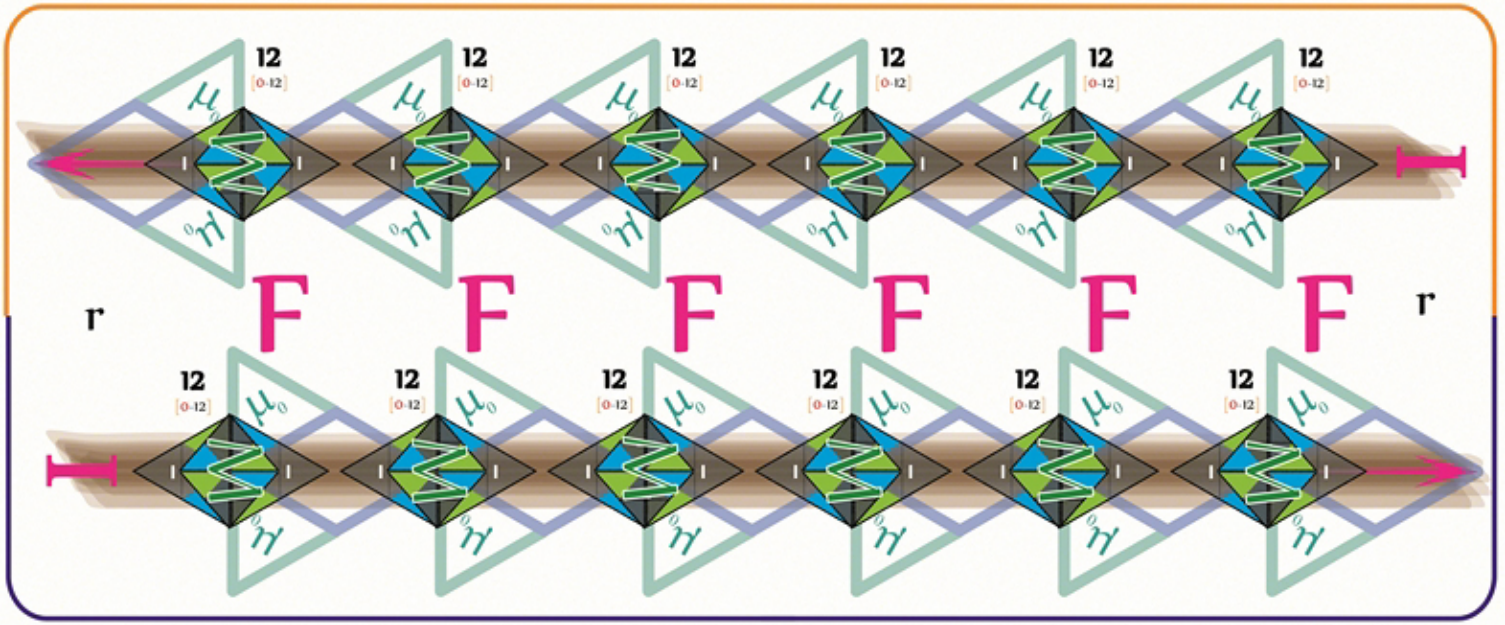
5.524527227 e-12 kg

kg

An Ampere is a Coulomb per second.
a measure of the rate at which charged Matter moves.

A coulomb is the quantity of charge transported by one amp in one second

1.60221681 e-19 | 1.60221681 e-19 | 1.60221681 e-19 | 1.60221681 e-19 | 1.60221681 e-19 | 1.60221681 e-19



8.851486 e-31 kg | 8.851486 e-31 kg | 8.851486 e-31 kg | 8.851486 e-31 kg | 8.851486 e-31 kg | 8.851486 e-31 kg

An ampere is one coulomb per second

C

$1C = 1A \cdot 1s$

As

A

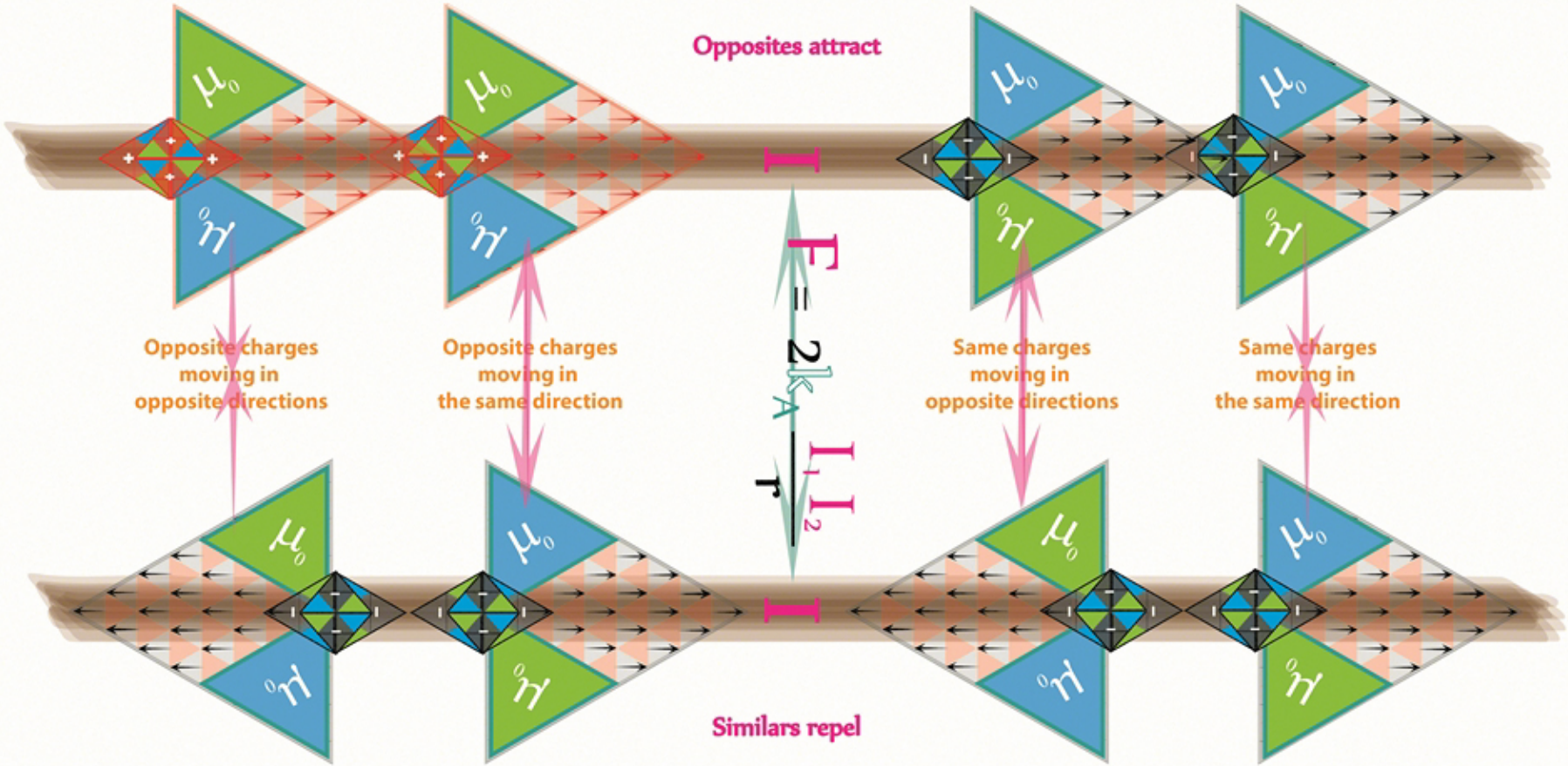
$1\,A = 1\frac{C}{s}$

$\frac{C}{s}$

Ampere's Magnetic Interactions

the force of attraction or repulsion between two current-carrying wires (see first figure below) is often called Ampère's force law.

The best-known and simplest example of Ampère's force law, which underlies the definition of the ampere, the SI unit of current, states that the force per unit length between two straight parallel conductors is

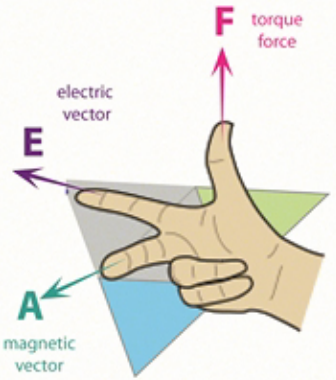


It is a measure of the interactive force produced by the Magnetic field energy-momenta of two superpositioned KEM field geometries

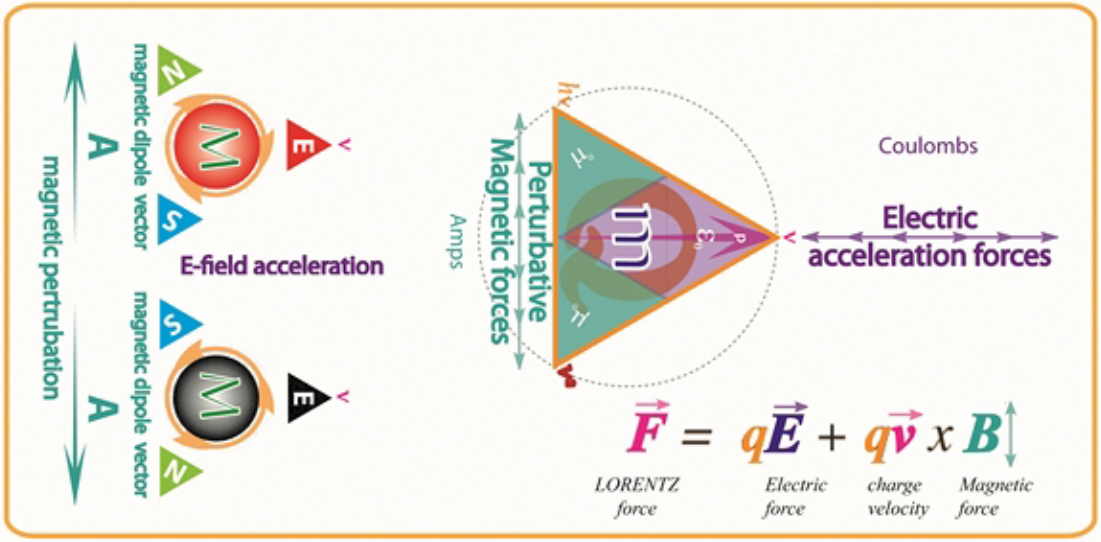
Lorentz Forces

If a particle of charge q moves with velocity v in the presence of an electric field E and a magnetic field B, then it will experience a force

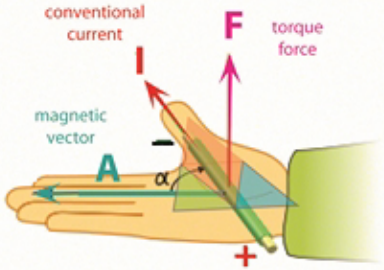
2D Electric field geometries accelerate charged particles



charged particles in motion produce KEM fields with magnetic moments



3D Matter topologies in motion create magnetic moments



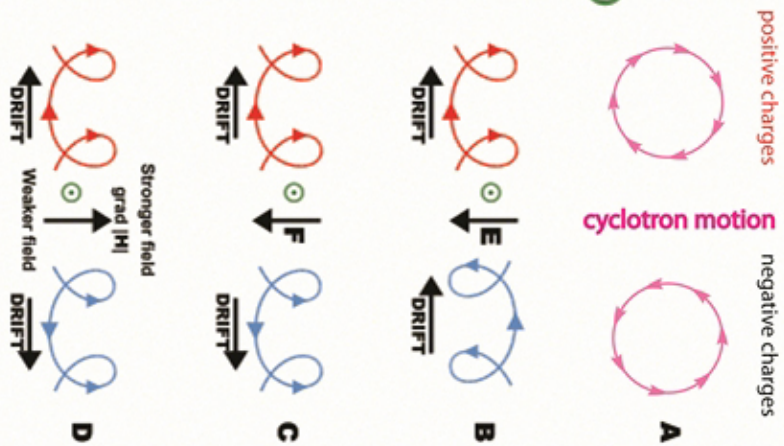
external magnetic fields create torque forces on the M dipoles of KEM fields

The Lorentz force is the force on a charged particle due to external electromagnetic fields.

Charles-Augustin de Coulomb

(14 September 1736 – 23 August 1806)

Magnetic field upwards through paper ⊙



All charges in motion are subject to external EM forces on their KEM fields

Andre Ampere

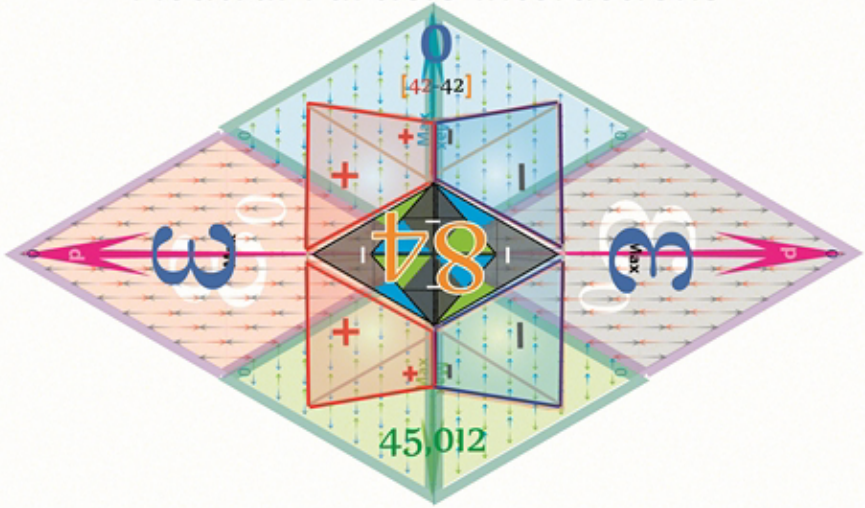
(20 January 1775 – 10 June 1836)

Neutral Particle interactions

Opposites Attract

Classical Forces of interaction
are unable to explain
how Neutral particles
are attracted to other particles

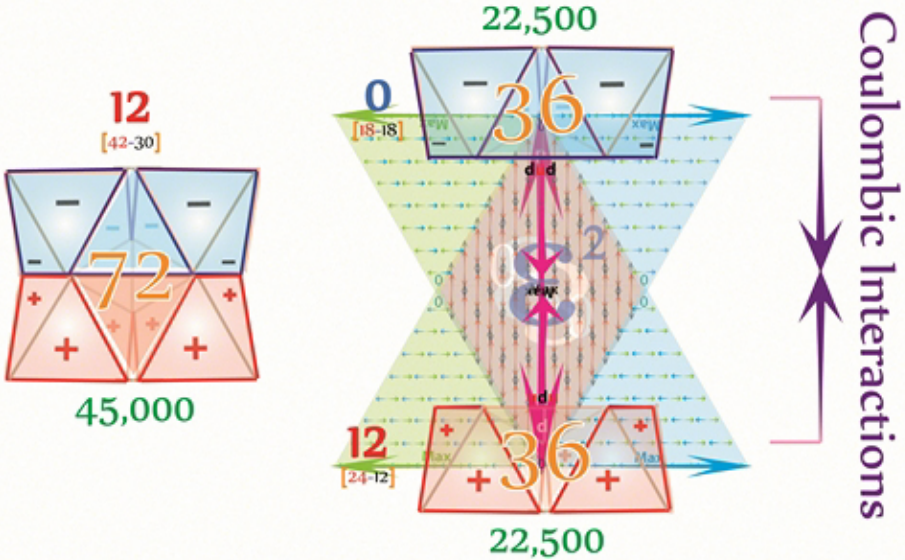
Similars Repel

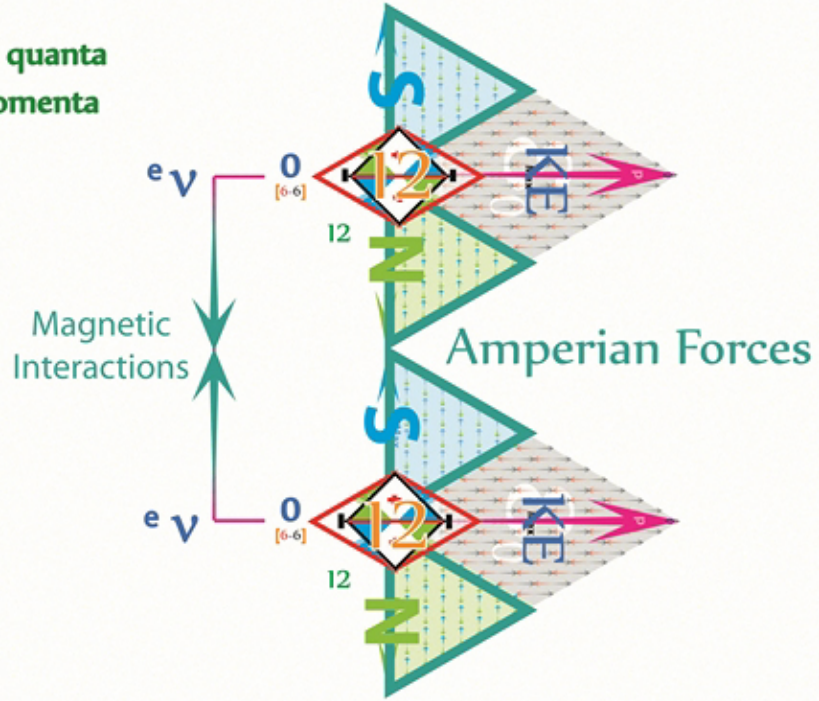


Tetryonic charge geometry

reveals the equilateral field mechanics behind
EM induction and all the physical forces

All Matter topologies are comprised of charged mass-energy quanta that effect atomic interactions via their KEM field energy momenta





All Matter in motion produces a secondary interactive KEM field

Coulombs

C

kg.s

mass seconds

$1\mathrm{C} = 1\mathrm{A} \cdot 1\mathrm{s}$

An elementary charge is 1.602216081 e-19 C

Charge is measured by the linear forces produced by the 2D equilateral geometry of mass-energy momenta

2D kEM angular mass-energy momenta

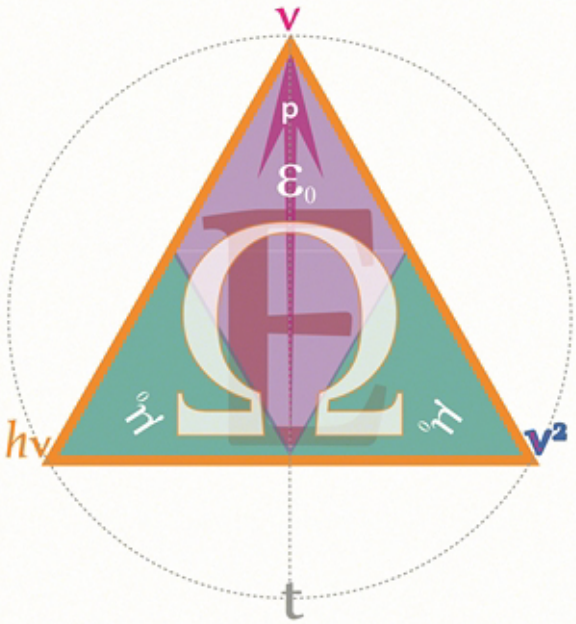
It is defined as the charge provided by a steady current of one ampere in one second.

Charge

Q

Charged mass-Matter

All particles and fields have charged mass-energy geometries



CHARGE

One coulomb of charge flowing per second equals one ampere of current.

CURRENT

$$Q = I \,.\, t$$

Charge and Current are related to each other through time

Amperes

A

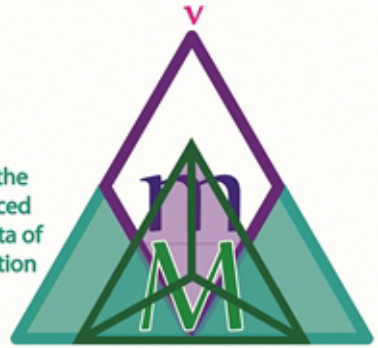
KG

mass-Matter per second

$1\,\mathrm{A} = 1\frac{\mathrm{C}}{\mathrm{s}}$

6.241355408 e18 electrons /sec constitutes one ampere.

Current is measured by the transverse forces produced by mass-energy momenta of Matter topologies in motion per unit of time

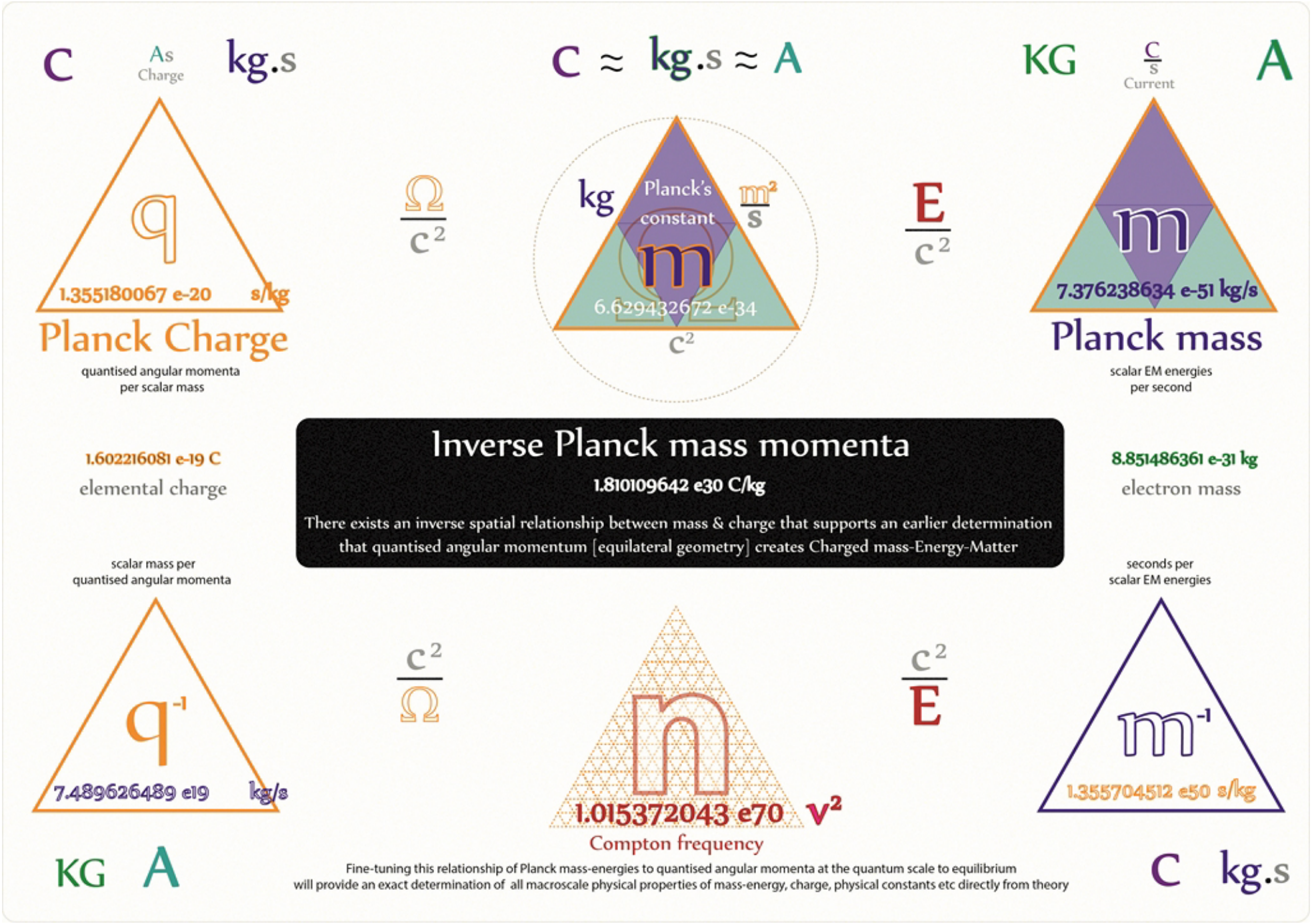


3D mass-Matter momentum

The amount of charged mass- Matter passing a point per unit time

Current

I



Electricity

Benjamin Franklin

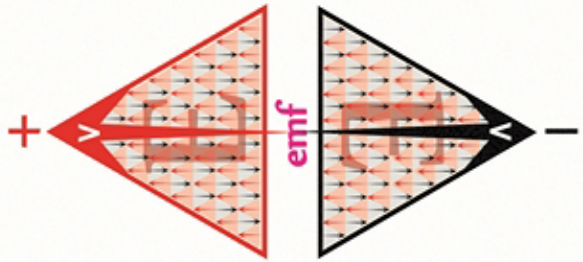
(January 17, 1706 – April 17, 1790)

"There exists Negative and Positive electrical quanta"

Electromagnetism: a fundamental interaction between the magnetic field and the presence and motion of an electric charge topology.

Electric charge: the geometry of EM energy momenta, also determines their electromagnetic interactions.

Electrically charged Matter topologies are influenced by, and produce, electromagnetic fields when in motion



Electric potential: the capacity of an electric field to do work on an electric charge, typically measured in volts..

Charles-Augustin_de_Coulomb
(14 September 1736 – 23 August 1806)

Andre Ampere
(20 January 1775 – 10 June 1836)

Georg Simon Ohm
(16 March 1789 – 6 July 1854)

Carl Friedrich Gauss
(30 April 1777 – 23 February 1855)

Heinrich Lenz
(February 12, 1804 – February 10, 1865)

Michael Faraday
(22 September 1791 – 25 August 1867)

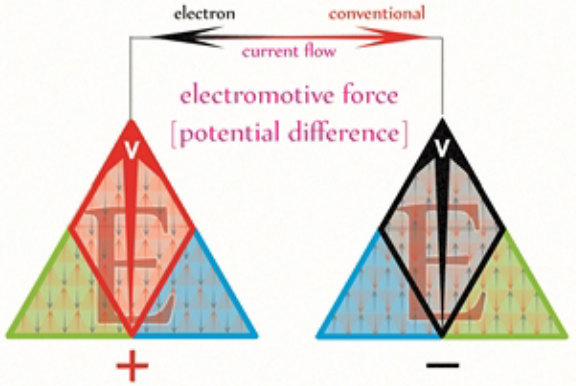
James Clerk Maxwell
(13 June 1831 – 5 November 1879)

James Prescott Joule
(24 December 1818 – 11 October 1889)

John Henry Poynting
(9 September 1852 – 30 March 1914)

Nikola Tesla
(10 July 1856 – 7 January 1943)

Electric field: an influence produced by one electric charge on other charges in its vicinity.



Electricity is the flow of Energy between separated Charge potentials when an electric circuit is formed measured in Volts [Joules/C]

Electric current: is a secondary effect resulting from electrical energy in a circuit it is the movement or flow of electrically charged particles, typically measured in amperes.

Electricity is a general term encompassing a variety of phenomena resulting from the presence and flow of electric charge.
These include many easily recognizable phenomena, such as lightning, static electricity, and the flow of electrical current in an electrical wire.
In addition, electricity encompasses less familiar concepts such as the electromagnetic field and electromagnetic induction.

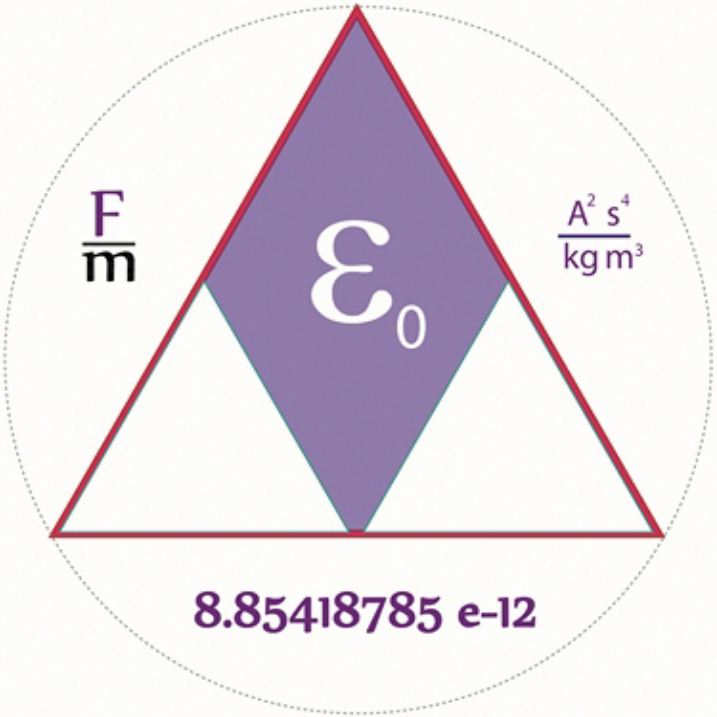
EM field Permittivity

The Electric constant, commonly called the vacuum permittivity, or permittivity of free space, relates the units for electric charge to mechanical quantities such as length and force.

The name Vacuum Permittivty is a misnomer and should be replaced with the correct term EM field Permittivity

The strength of Electric fields is determined by the Electrical Permittivity Constant

$$E = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$$



8.85418785 e-12

The permittivity of empty space, equal to 1 in centimeter-gram-second electrostatic units and to 107/4πc2 farads per meter or, numerically, to 8.854 × 10-12 farad per meter in International System units, where c is the speed of light in meters per second.

$$\varepsilon_0 = \frac{1}{\mu_0 c^2}$$

"Ampere's Law states that for any closed loop path, the sum of the quantities (B.ds) for all path elements into which the complete loop has been divided is equal to the product of μ0 and the total current enclosed by the loop."

$$k = \frac{1}{4\pi\varepsilon_0}$$

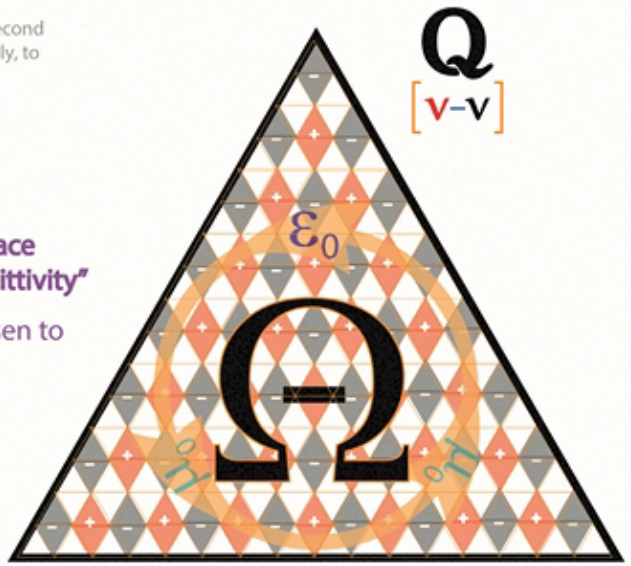
Positive Charge Electric Field

Gauss' Law:

"The total of the electric flux out of a closed surface is equal to the charge enclosed divided by the permittivity"

This applies equally to any integral geometry chosen to tessellate a surface area

Superpostioned E fields gives rise to Coulomb Forces



Negative Charge Electric Field

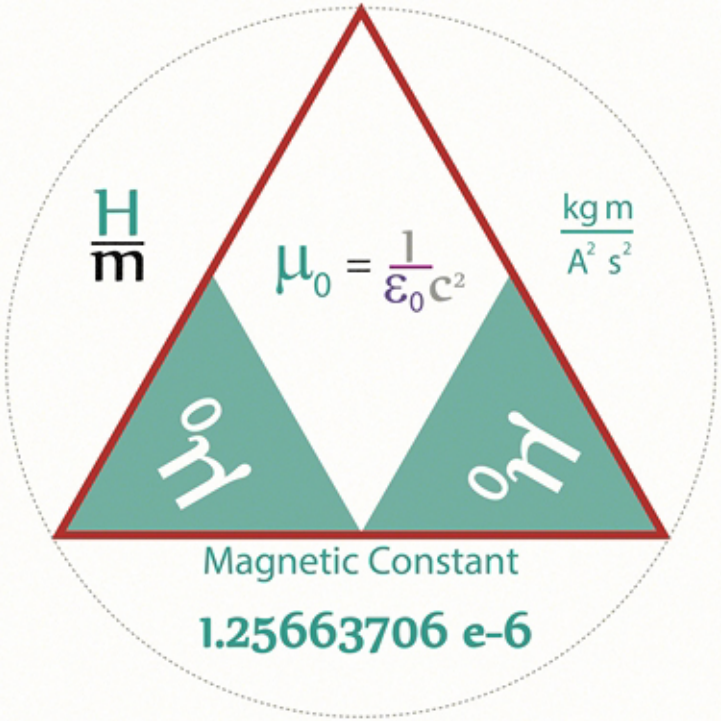
EM field Permeability

The permeability of free space,
also called absolute permeability.

The name Vacuum Permeability is a misnomer and should be replaced with the correct term EM field Permeability

The magnetic constant has the value of
$4\pi \times 10\text{-}7$ henry per meter.

The strength of Magnetic fields is determined by the Magnetic Permeability Constant



μ_0

The magnetic field is most commonly defined in terms of the Lorentz force it exerts on moving electric charges.

F

The magnetic field generated by a steady current (a constant flow of electric charges in which charge is neither accumulating nor depleting at any point) as described by the Biot–Savart law

$B=\mu_0 H$

Positive Magnetic Moment

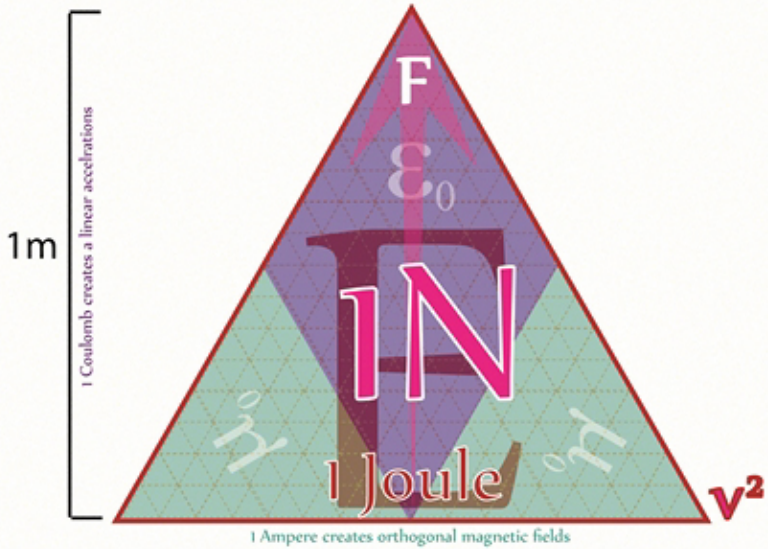
Magnetic monopoles do NOT exist

they are a mathematical identity
and not physically possible due to
the equilateral geometry
of Planck energies

Negative Magnetic Moment

James Prescott Joule

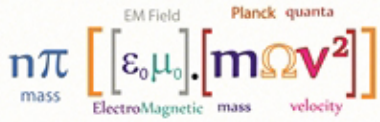
(24 December 1818 – 11 October 1889)



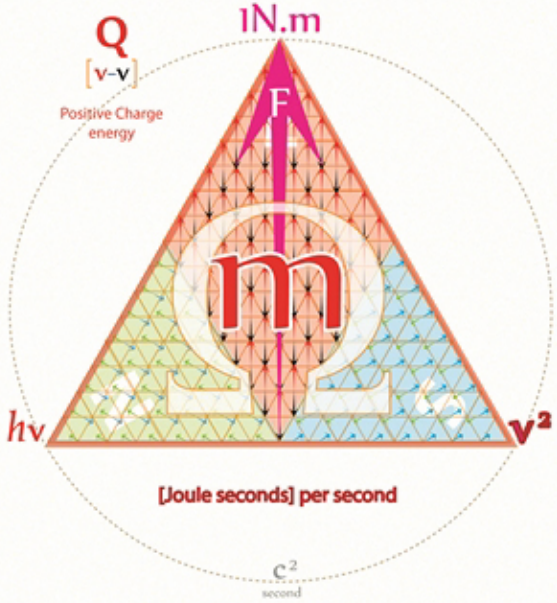
Joule

A measure of the equilateral charged mass-energy momenta that can to do work

... the mechanical power exerted in turning a magneto-electric machine is converted into the heat evolved by the passage of the currents of induction through its coils; and, on the other hand, that the motive power of the electro-magnetic engine is obtained at the expense of the heat due to the chemical reactions of the battery by which it is worked (1845)



It is equal to the energy expended (or work done) in applying a force of one newton through a distance of one meter (1 newton metre or N·m), or in passing an electric current of one ampere through a resistance of one ohm for one second



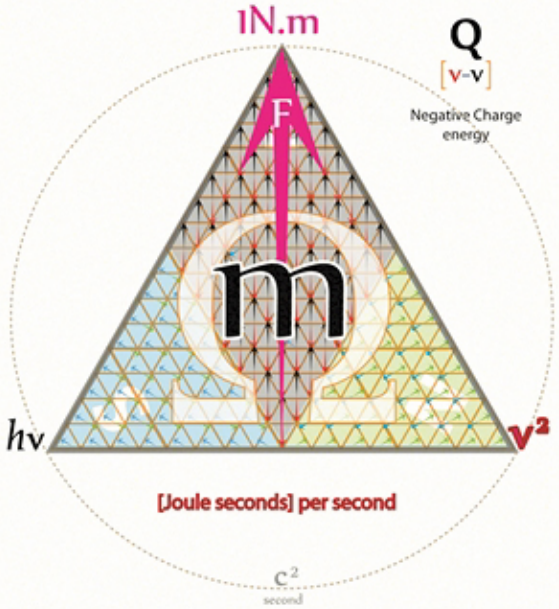
Energy $kg.\frac{m^2}{s^2}$

$$J = \frac{kg \cdot m^2}{s^2} = N \cdot m = Pa \cdot m^3 = W \cdot s$$

Planck's Constant x frequency $[kg.\frac{m^2}{s}].s^{-1}$

mass x velocity squared $kg.[\frac{m}{s}]^2$

Momentum x velocity $[kg.\frac{m}{s}].\frac{m}{s}$



Volts

[Joules per Coulomb]

The volt is the unit for electric potential (voltage), electric potential difference, and electromotive force.

$$V = \frac{W}{A} = \frac{J}{A \cdot s} = \frac{N \cdot m}{A \cdot s} = \frac{kg\,m^2}{A\,s^3} = \frac{kg \cdot m^2}{C \cdot s^2} = \frac{N \cdot m}{C} = \frac{J}{C}$$

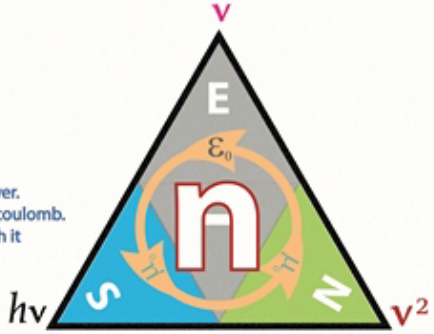
A single volt is defined as the difference in electric potential across a wire when an electric current of one ampere dissipates one watt of power.
It is also equal to the potential difference between two parallel, infinite planes spaced 1 meter apart that create an magnetic field of 1 newton per coulomb.
Additionally, it is the potential difference between two points that will impart one joule of energy per coulomb of charge that passes through it

Positive charge

1V = 1J/C

One Volt is defined as energy consumption of one joule per electric charge of one coulomb

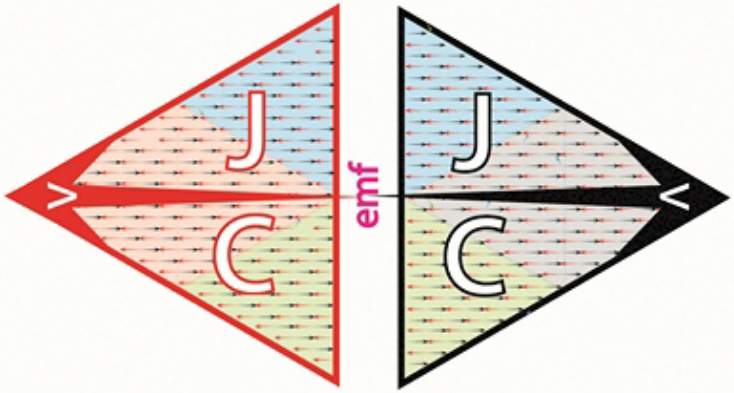
Negative charge



1V = 1A · 1ohm

One volt is equal to current of 1 amp times resistance of 1 ohm

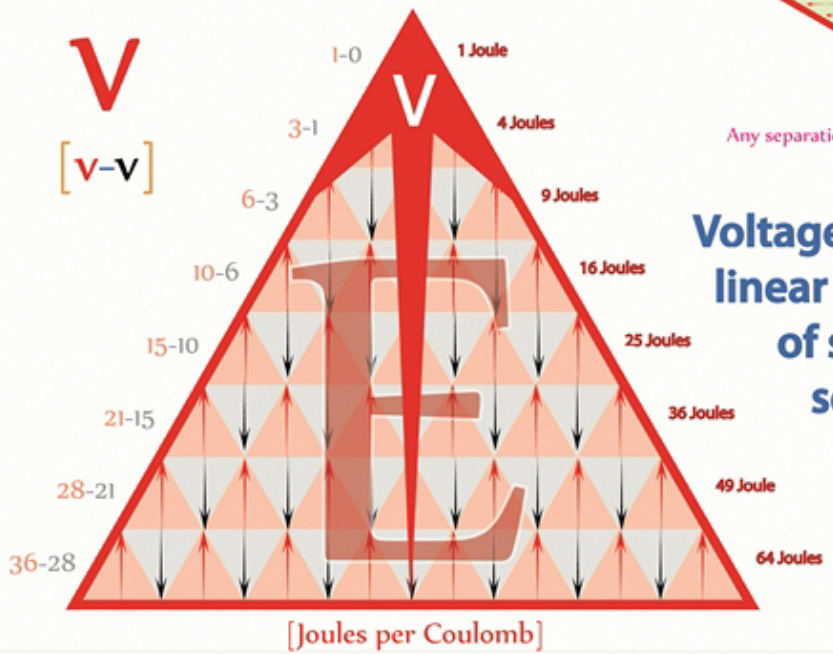
Positive voltage

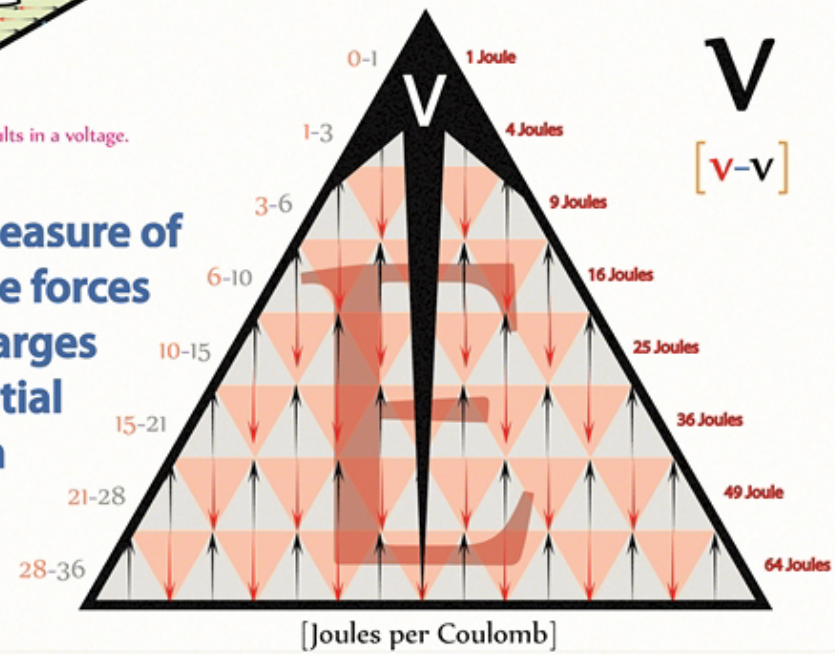


Negative voltage

Any separation of electrostatic charges, results in a voltage.
[Potential Difference]

Voltage is a scalar measure of linear electromotive forces of separated charges seeking potential equilibrium





Positive charged mass-energy

1
[1-0]

Clockwise inductive energy flux

Charge is the equilateral geometry of Energy that gives form to all mass & Matter

charge

time

Negative charged mass-energy

1
[0-1]

Counter clockwise energy flux

q

$$t \left[\frac{\Omega}{c^2} \quad \frac{m^2}{s}\frac{s^2}{m^2} \quad s \right] t$$

seconds

q

ElectroMagnetic Charge is a quantum property resulting from the equilateral QAM geometry of mass-Energy

1.33518 e-20 s

Changes to nett quantised angular momenta [charged mass-energies] within any space-time co-ordinate system forms the basis of time

The two ElectroMagnetic charge geometries possible can be created through tesselation of electrical energy in ideal inductive loops

Coulombs

are a measure of 2D charged mass geometries
and the electromagnetic forces they produce per unit time

W+ boson integrals
nett positive charged
mass momenta

Q
$[v-v]$

Charles-Augustin de Coulomb

(14 September 1736 – 23 August 1806)

Q
$[v-v]$

W- boson integrals
nett negative charged
mass momenta

Derived in 1785 Coulomb's Law is a law of physics describing the electrostatic interaction between any two charged particles (and forms the basis for Ampere's Law)

Electric forces

$$\frac{m\Omega}{c^2}$$

Magnetic forces

Coulombs

The coulomb (unit symbol: C) is the SI derived unit of electric charge (symbol: Q or q).
It is defined as the charge transported by a steady current of one ampere in one second:

Amperes

As

$kg.s$

$\frac{C}{s}$

Interactive linear momenta of super-positioned E-fields creates Coulomb's force law

$\frac{c^2}{sec}$

1A.1s

1F.1V

$1C = 1A \cdot 1s$

1 COULOMB is a measure of linear 2D electric field energy momenta in EM field geometries

1 AMPERE is a measure of orthogonal 2D magnetic field forces produced by Matter topologies in motion

$1\,A = 1\frac{C}{s}$

C quantised electrical energy momenta A

1C is the quantity of charged masses which pass any point in a circuit in which a current of 1A flows for 1s

Coulombs

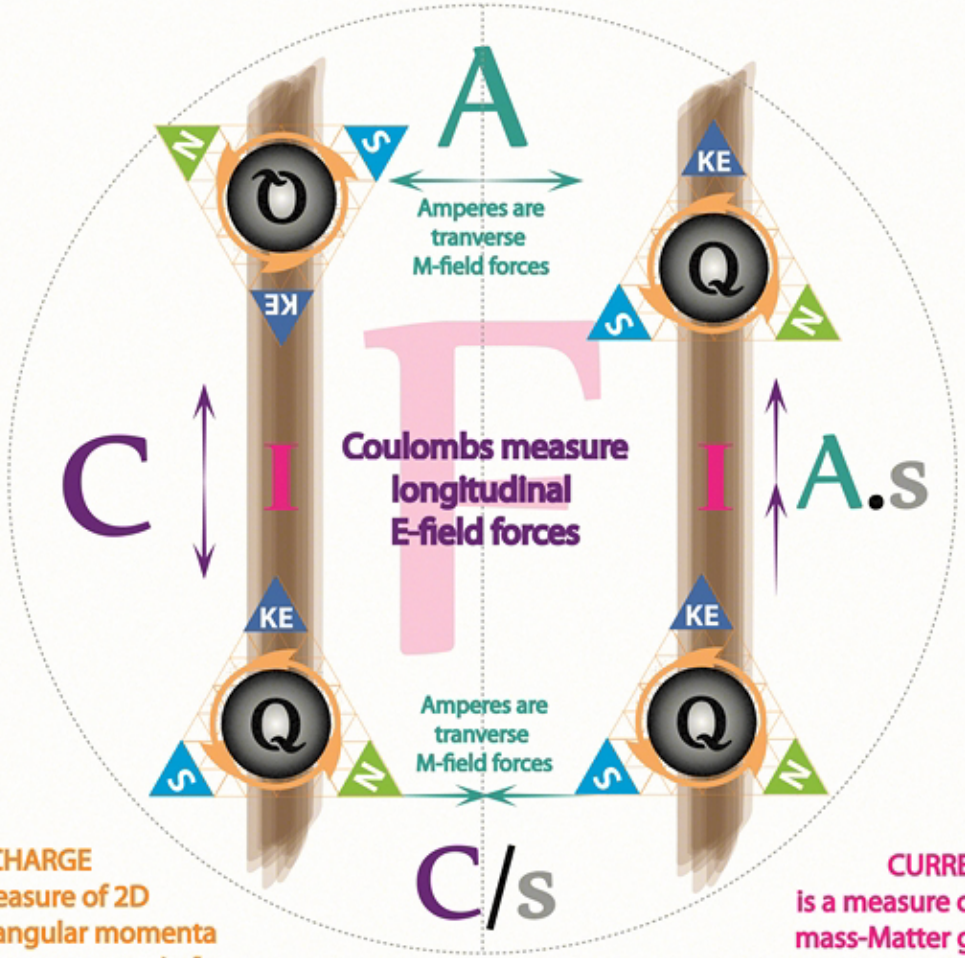
Amperes

kg.s

KG

linear acceleration energy momenta

magnetic perturbation energy momenta



Q

Charge

CHARGE is a measure of 2D quantised angular momenta [mass -Matter geometries]

CURRENT is a measure of charged mass-Matter geometries in motion

I

Current

$Q = I.t$

quantity of charge = rate of flow of charge × time

Current

is a measure of charged Matter in motion in a circuit per unit of Time

An elementary charge is
1.602216081 e-19 C

C

Coulombs

It is defined as the charge transported by a steady current of one ampere in one second.

I

Amperes

The amount of electric charge passing a point per unit time

A

6.2413354 e18 electrons passing a given point each second constitutes one ampere.

charged masses

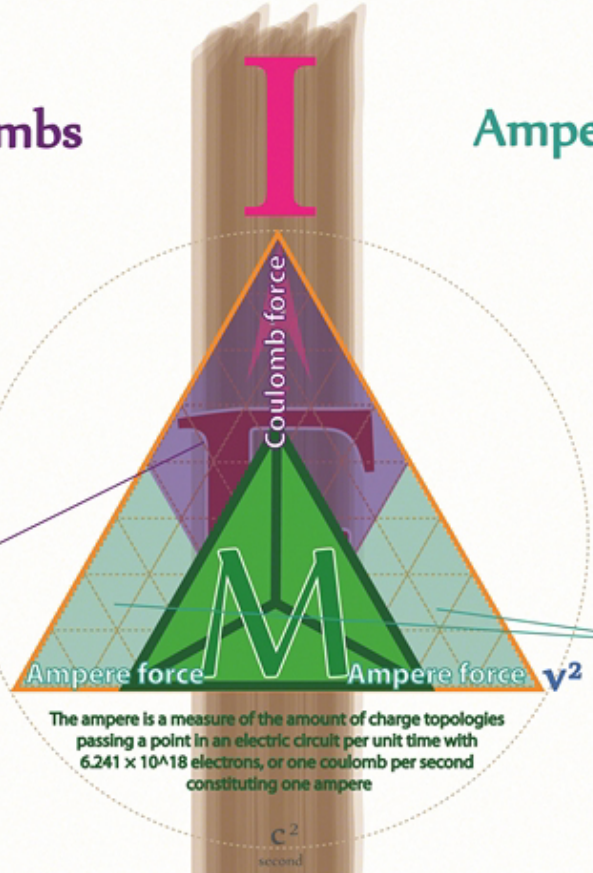
kg.s

1.33518 e-20 kg.s

7.489626 e19 kg

Matter

KG



The 2D linear mass-energy momenta capable of accelerating charged particles

The transverse magnetic forces produced by Matter in motion

$1\mathrm{C} = 1\mathrm{A} \cdot 1\mathrm{s}$

$1\,\mathrm{A} = 1\frac{\mathrm{C}}{\mathrm{s}}$

Electric current is a measure of the flow of electrically charged mass-Matter in a circuit as a result of an electrical Voltage potential

As

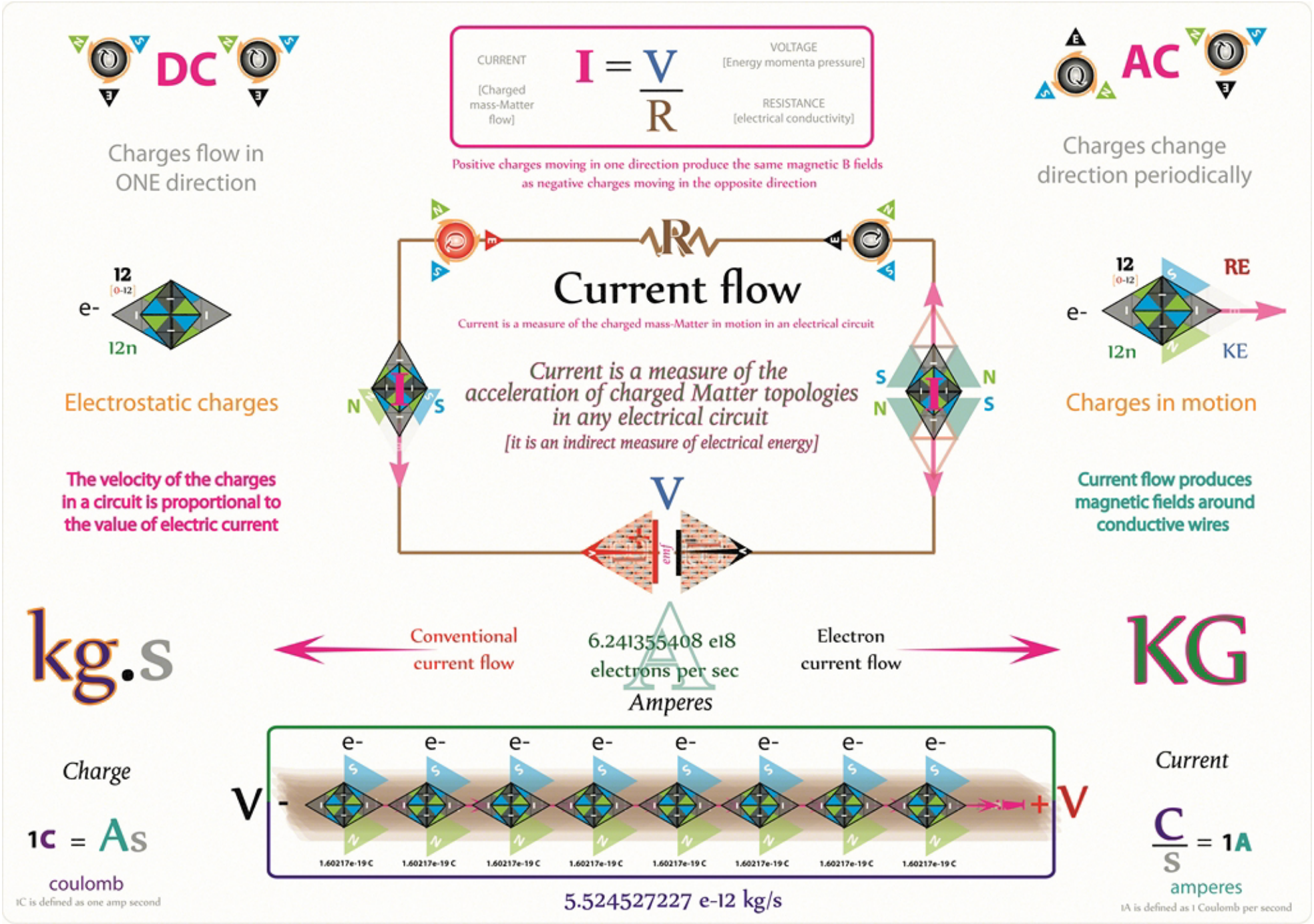
5.524527227 e-12 kg

Charged mass — 1 second — Matter in motion

6.241355408 e18 electrons

C/S

Voltage [emf] is a measure of the energy momenta per coulomb available to exert a force on charged Matter in a circuit



The electrical resistance of a conductor is a measure of how much it opposes the passage of an electric current through it

OHM's Law

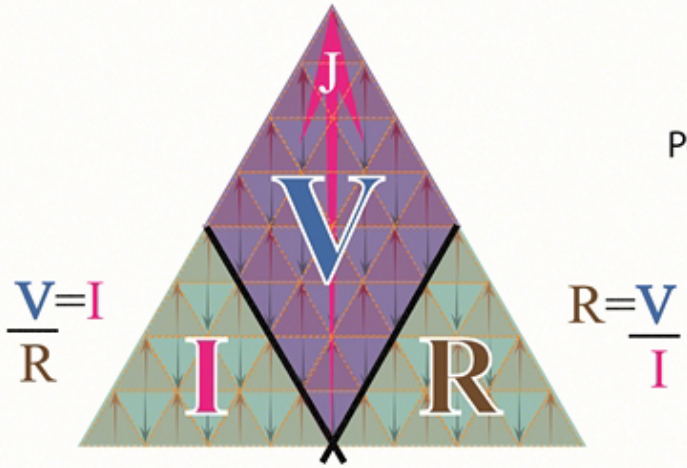
Georg Simon Ohm

(16 March 1789 – 6 July 1854)

$$\mathcal{E} = \rho J$$

$\mathcal{E}$: Electric field; ρ: resistivity; J: Current density

General vector equation



$$\frac{V}{R} = I \qquad R = \frac{V}{I}$$

$$V = I.R$$

$$P = I.V = I^2.R$$

Power is the amount of current times the voltage level at a given point measured in watts.

Current is the flow of charged mass-Matter resulting from an electromotive force

Resistance determines how much current will flow through a conductor

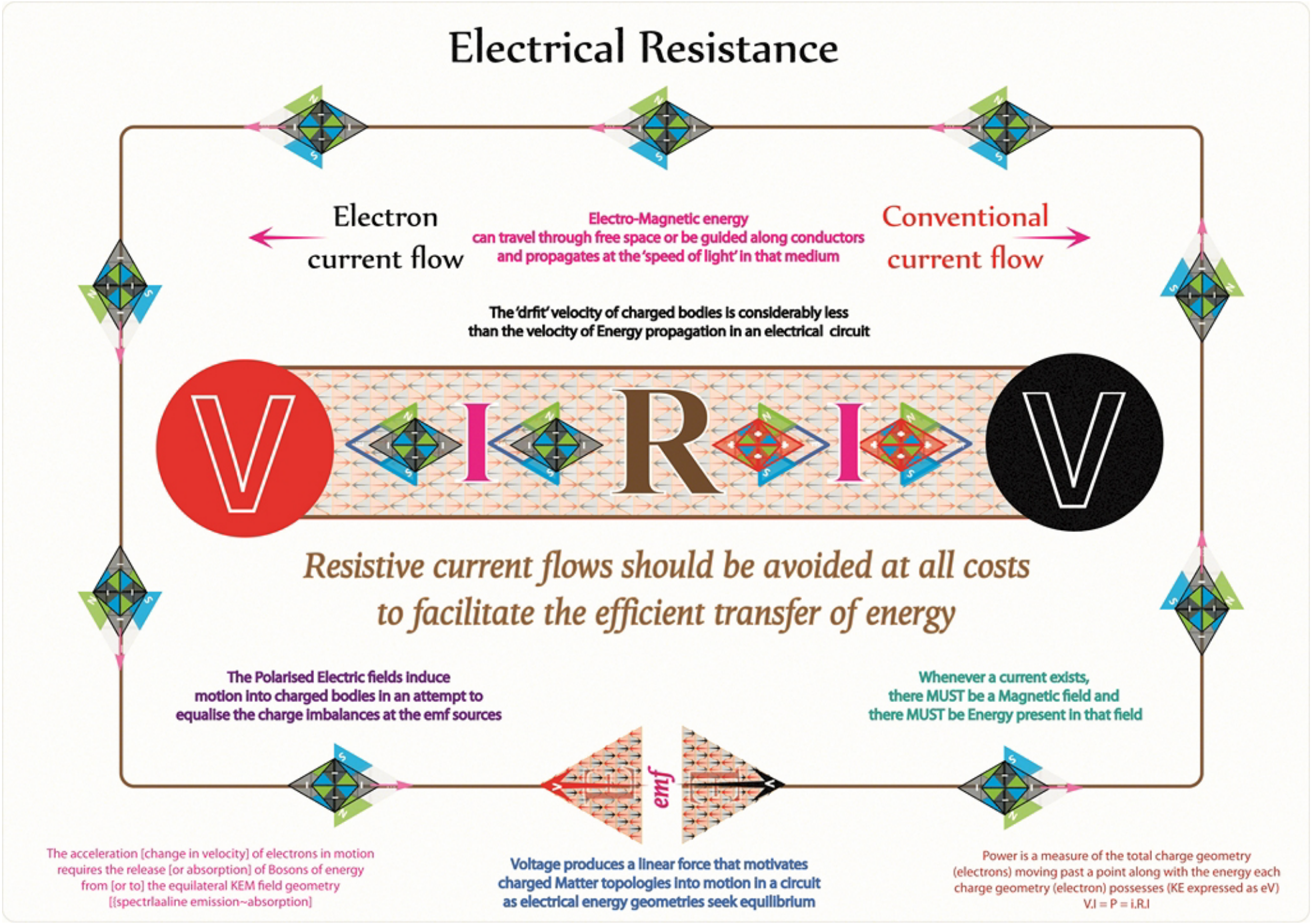
Current [I.V] Voltage
POWER
Current squared [I^2R] Resistance

Ohm's law states that the current through a conductor between two points is directly proportional to the potential difference across the two points.

By introducing the constant of proportionality, Resistance, one arrives at the usual mathematical equation that describes this relationship

Voltage is the force motivating charges to "flow" in a circuit, it is measured as the difference in electrical potential between two points in a circuit

Electrical Resistance



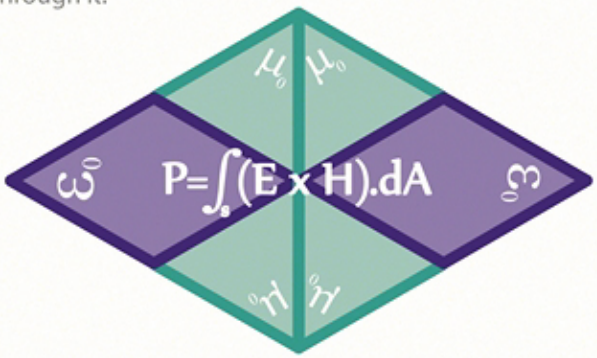
James Prescott Joule verified Ohm's Law and determined that the heat delivered by a conductor is directly proportional to its resistance and to the square of the current through it.

He defined Power physically to be the rate at which electrical energies are created or transferred in an electric circuit

All energy is comprised of 2D charged masses

Electrical Power

Power is the integral of the cross-product of all electrical and magnetic field vectors produced by scalar energy momenta within a specific area defined by time

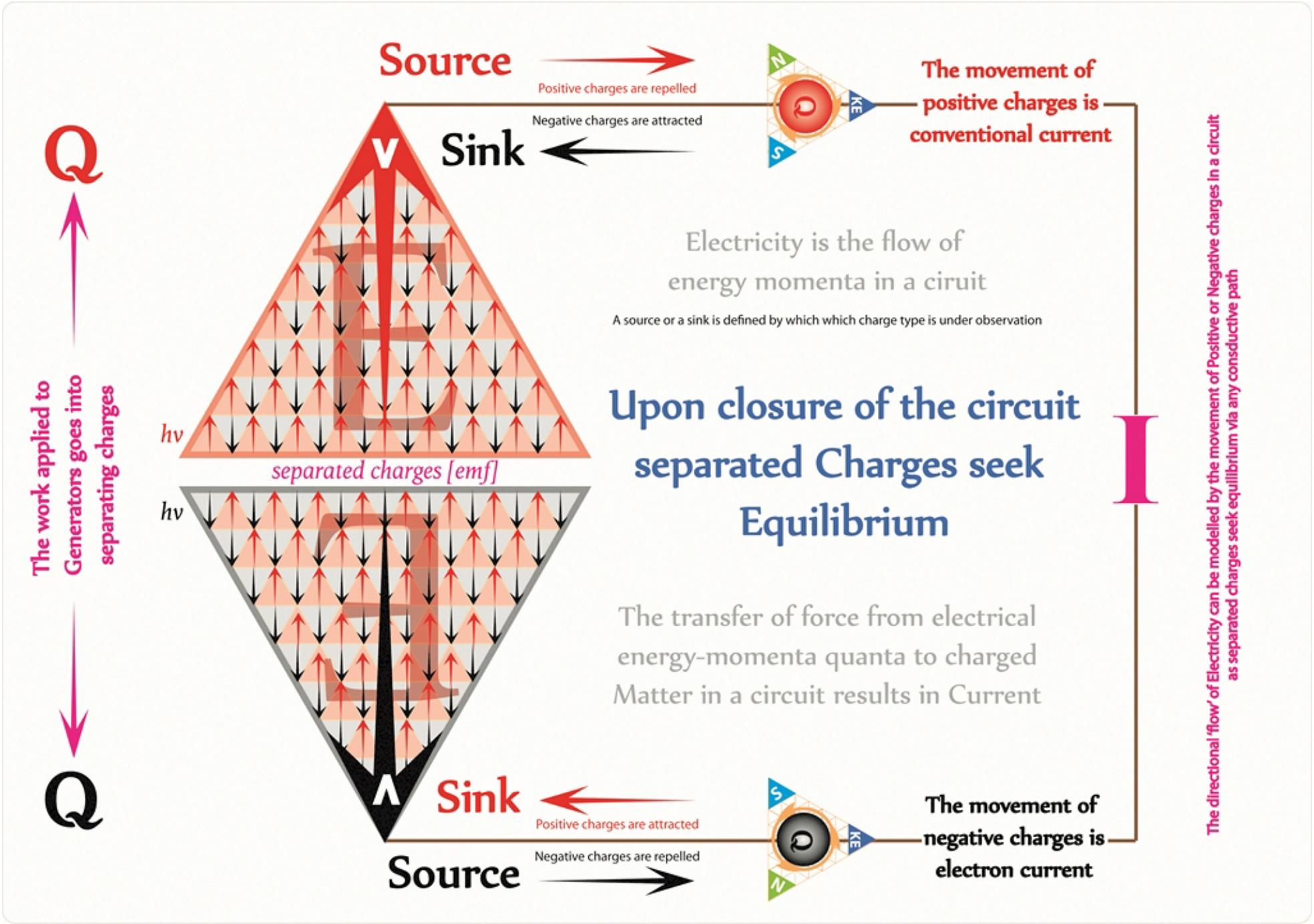


The scalar surface integral of the Poynting vector.

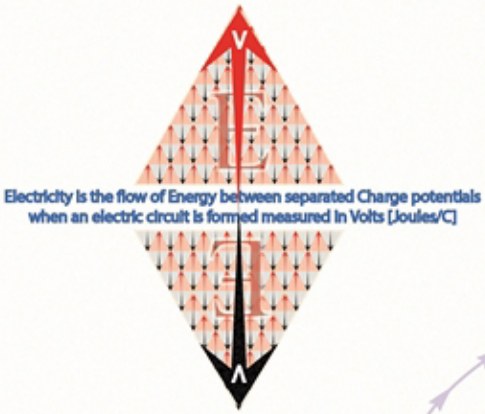
The SI unit of power is the watt, one joule per second.

Electrical power flows wherever Electric and Magnetic fields exist together and change over time

Electrical power propagates at the speed of light in an electrical circuit [dependent on the voltage source] electrons have a vastly slower 'drift' velocity resulting from their inertial interaction with energy momenta of the Voltage [emf] field



EM Inductive circuits



Electricity is the flow of Energy between separated Charge potentials when an electric circuit is formed measured in Volts [Joules/C]

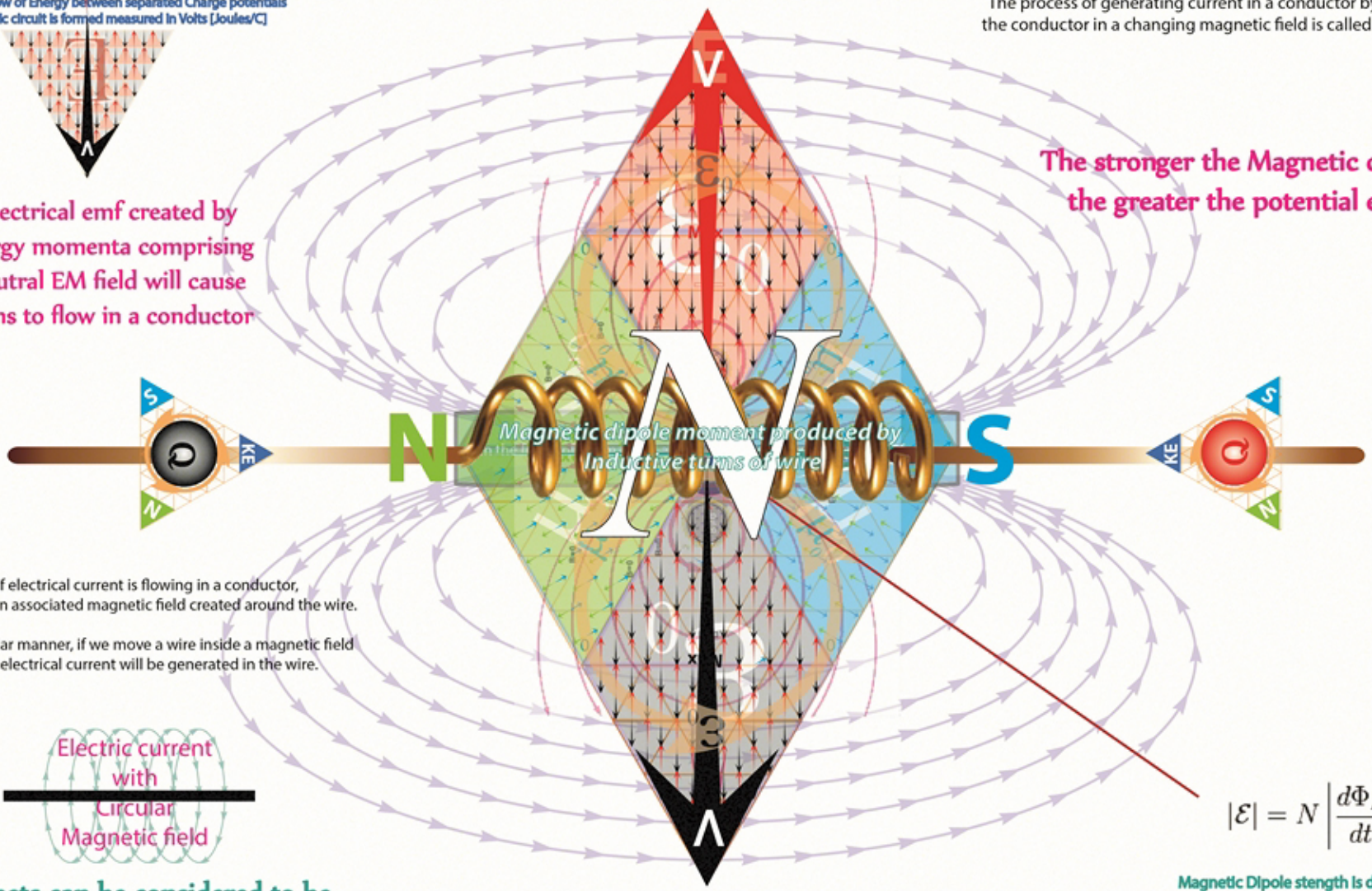
The Electrical emf created by the energy momenta comprising the neutral EM field will cause electrons to flow in a conductor

Neutral Electric field with Magnetic dipole

Current is produced in a conductor when it is moved through a magnetic field because the neutralised Electric field lines are applying a emf on the free electrons in the conductor and causing them to move.

The process of generating current in a conductor by placing the conductor in a changing magnetic field is called induction

The stronger the Magnetic dipole the greater the potential emf



If electrical current is flowing in a conductor, there is an associated magnetic field created around the wire.

In a similar manner, if we move a wire inside a magnetic field an electrical current will be generated in the wire.

Magnets can be considered to be static stores of potential [emf fields]

Magnetic DIpole with Neutral Electric field

$$|\mathcal{E}| = N\left|\frac{d\Phi_B}{dt}\right|$$

Magnetic Dipole stength is dependent on:

The total Number of turns in the Inductor & the current flowing through the circuit

Electron Volts

The electron volt can also be used as a unit of mass-energy by applying Einstein's relation $E = mc^2$.

For example, the rest mass-energy of electron topologies if 496,532 eV (496.532 MeV).

Chemically, for 1 mole of electrons
1 eV ~ 100 kJ mol-1 (96.49 kJ mol-1)

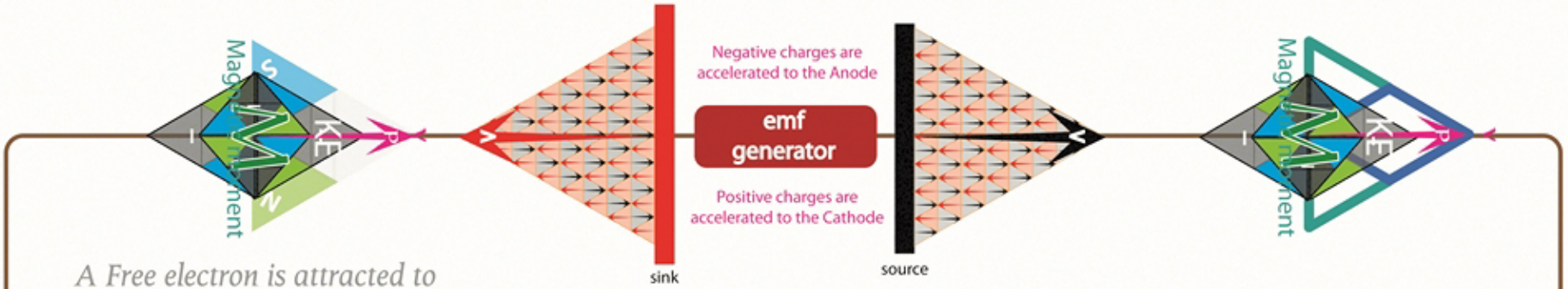
eV

A unit of energy equal to the work required to move one electron through a potential difference of 1 volt.

An Electron Volt is also a measure of Electrical Kinetic Energy

$$\frac{1}{2}\left[4\pi_{\text{Tetryons}}\left[\left[\varepsilon_0\mu_0\right]_{\text{ElectroMagnetic}}.\left[m_{\text{mass}}\Omega_{\text{velocity}}v^2\right]_{\text{Planck quanta}}\right]_{\text{EM Field}}\right]$$

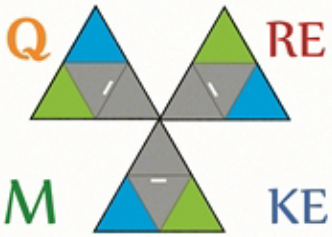
As distinct from Matter's ENERGY Kinetic Energy is 'extended from the Tetryonic geometry of all Matter in motion in a separate 2D KEM field



A Free electron is attracted to Positive anode of an emf source

The application of UFE to Kinetic energy calculations reveals the underlying processes of the Photo-electric effect and Light-Energy interactions with respect to Kinetic energy

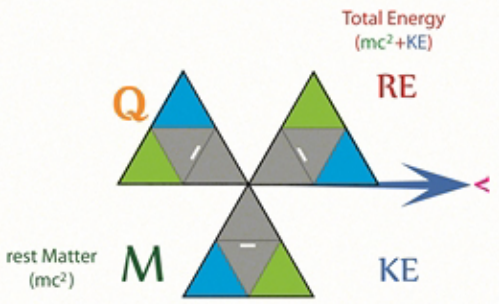
Accelerated electrons have increased KE, Magnetic moments & momentum



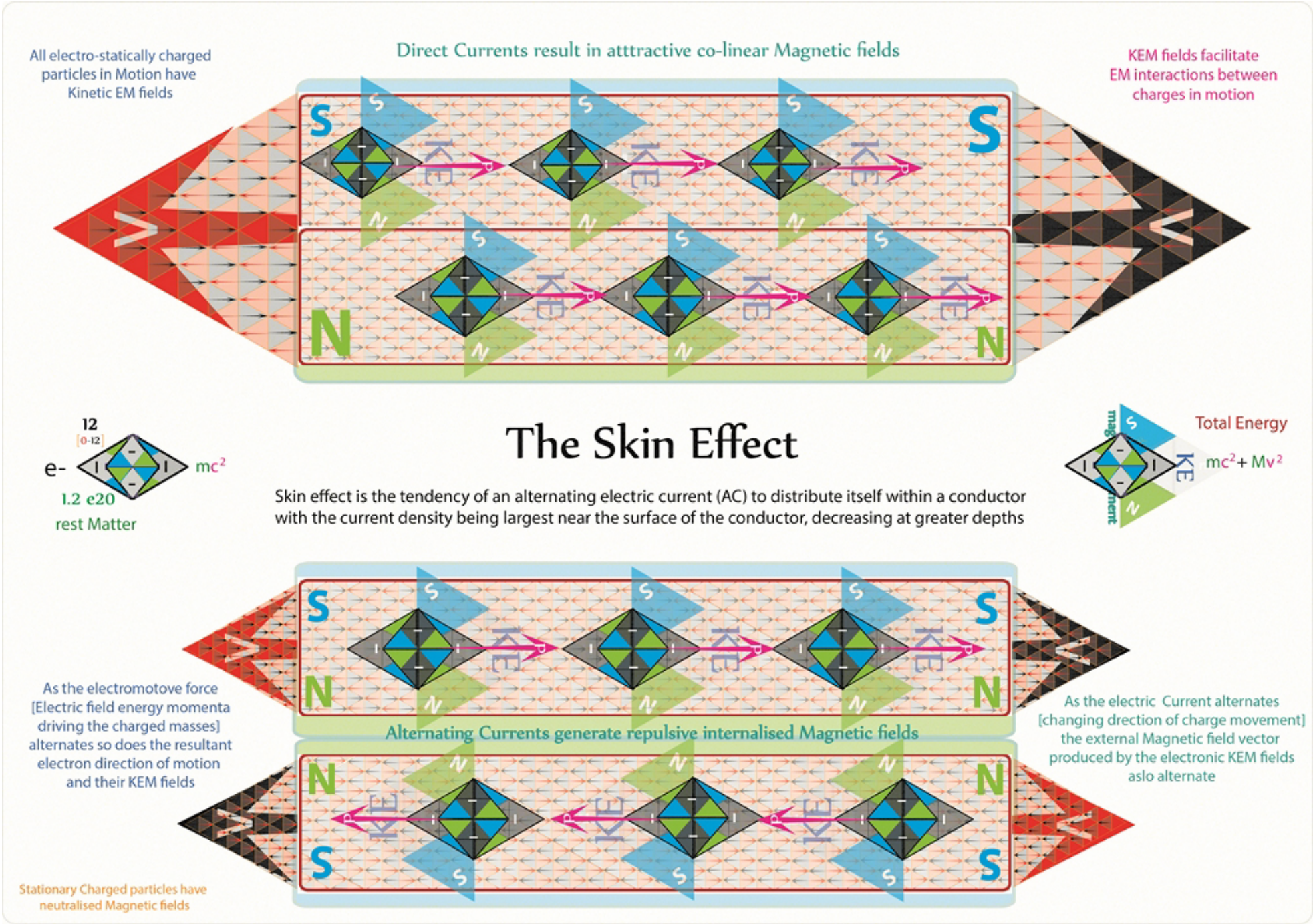
$$12\pi_{\text{Fermions}}\left[\left[\varepsilon_0\mu_0\right]_{\text{ElectroMagnetic}}.\left[m_{\text{mass}}\Omega_{\text{velocity}}v^2\right]_{\text{Planck quanta}}\right]_{\text{EM Field}}$$

$$\frac{p^2}{2m} = KE = \frac{1}{2}Mv^2$$

By definition, it is equal to the amount of kinetic energy momenta gained by a single unbound electron when it accelerates through an electric potential difference of one volt.



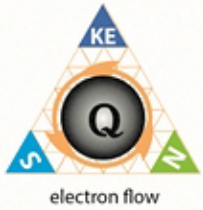
(Total Energy = Absolute rest Matter + Kinetic energy) additionally the Lorentz relativistic correction factor (β) presents itself naturally from the UFE when velocity is applied



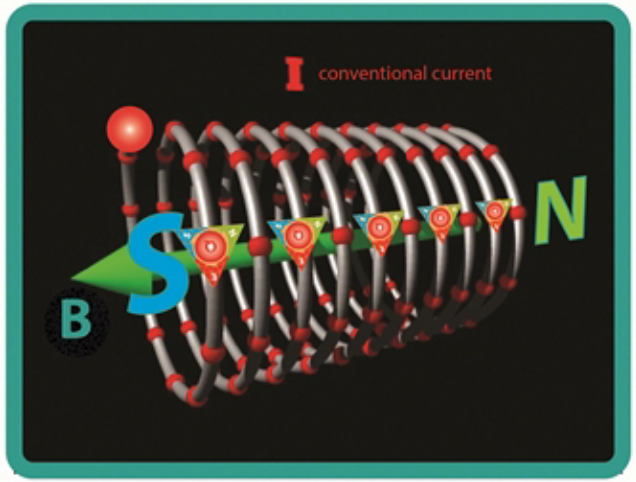
EM fields of particles in Motion

Positive changed quanta traveling anti-clockwise
in a solonoid creates a North-South magnetic field
orientated in the direction shown

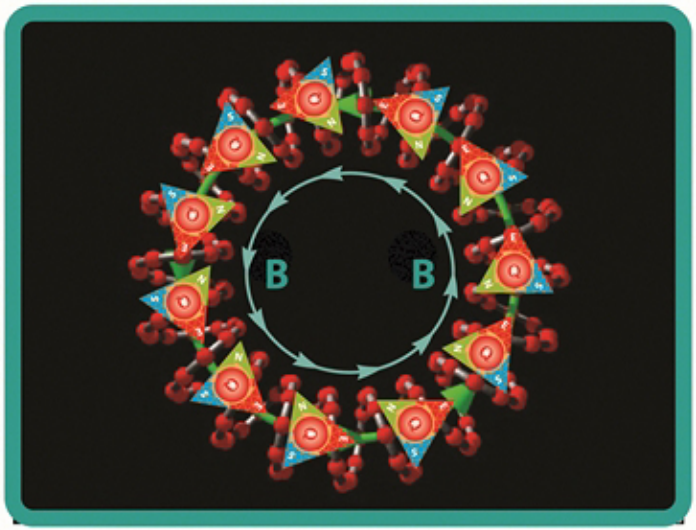
Negative charged quanta create a
reversed Magnetic dipole field and
reversing the direction of particle motion
also reverses the magnetic vector



Solenoidal Motion



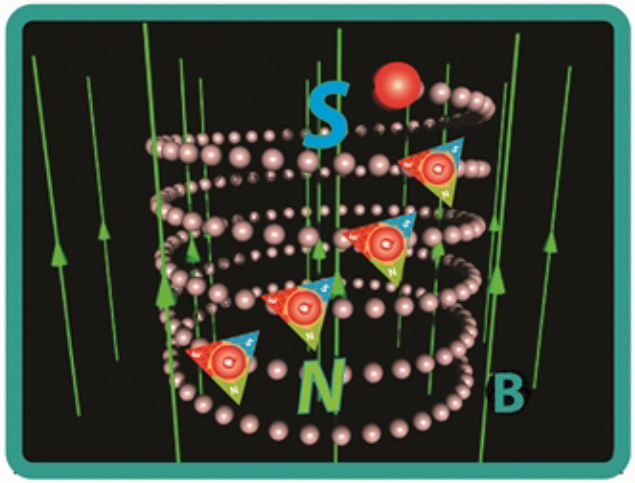
Charged particles moving in a spiral
produce a Circular Magnetic field



Toroidal Motion

A toroidally wound conductor produces
a Circular Magnetic field

Helical Motion



Motion in a Magnetic field

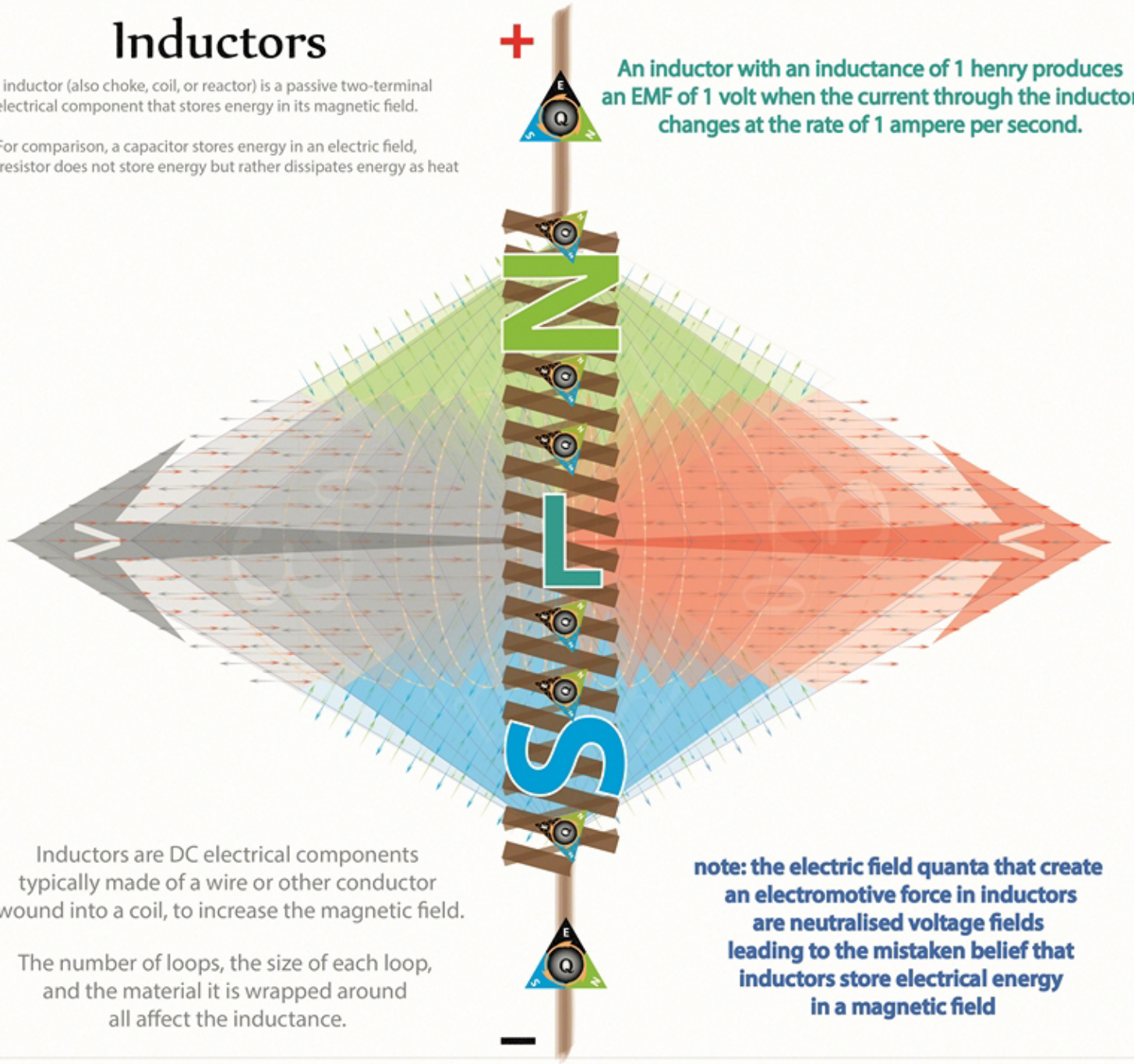
Inductors

An inductor (also choke, coil, or reactor) is a passive two-terminal electrical component that stores energy in its magnetic field.

For comparison, a capacitor stores energy in an electric field, and a resistor does not store energy but rather dissipates energy as heat

An inductor with an inductance of 1 henry produces an EMF of 1 volt when the current through the inductor changes at the rate of 1 ampere per second.

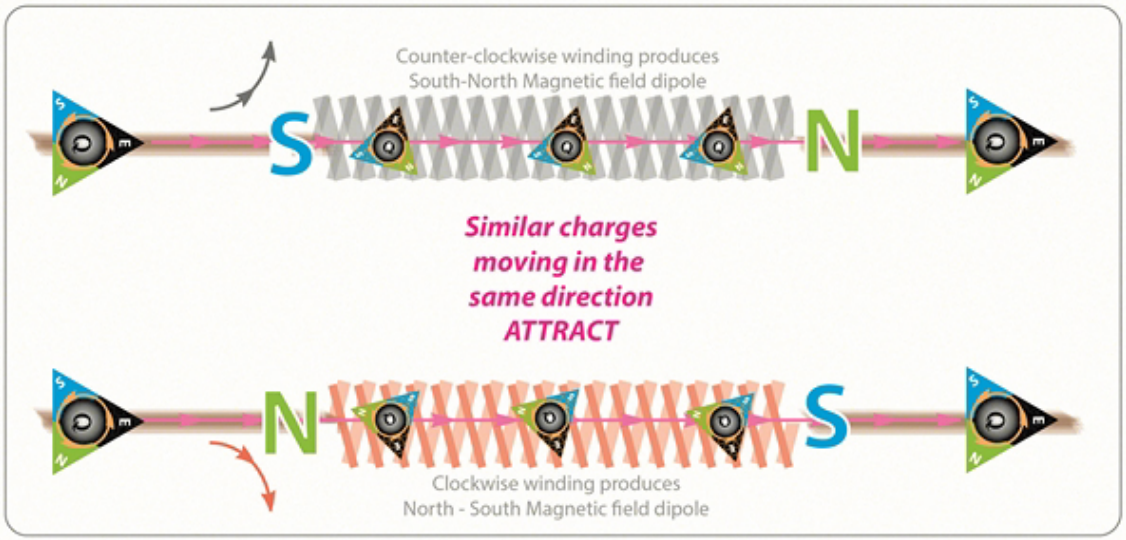
When the current flowing through an inductor changes, a time-varying electromagnetic field is created around the coil, and a changing emf voltage is formed

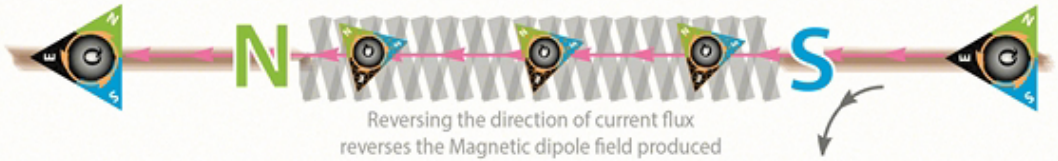


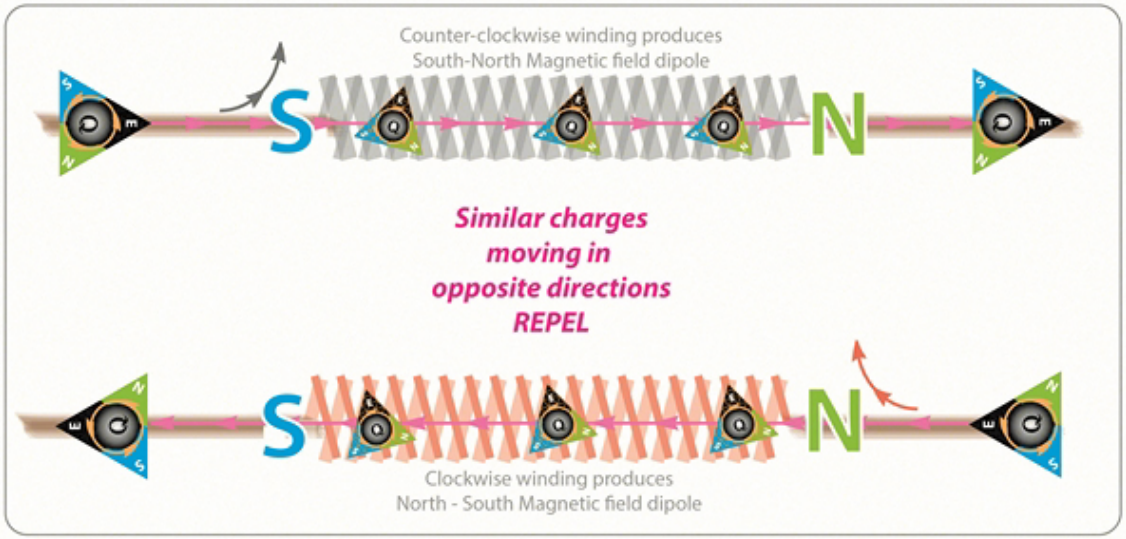
Inductors are DC electrical components typically made of a wire or other conductor wound into a coil, to increase the magnetic field.

The number of loops, the size of each loop, and the material it is wrapped around all affect the inductance.

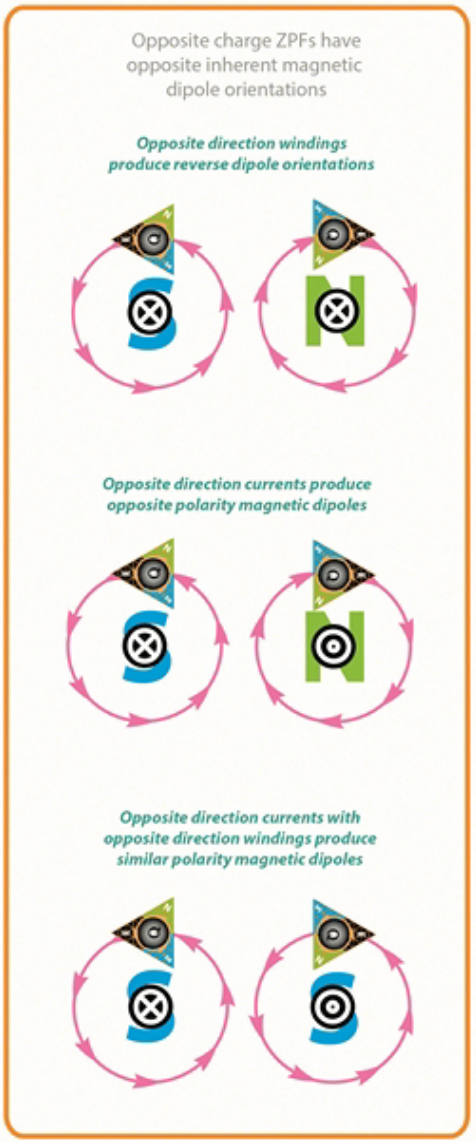
note: the electric field quanta that create an electromotive force in inductors are neutralised voltage fields leading to the mistaken belief that inductors store electrical energy in a magnetic field







Charges moving in an Inductive winding



This is best viewed using physical models

Capacitors

Changing Electric fields
create
changing Magnetic fields

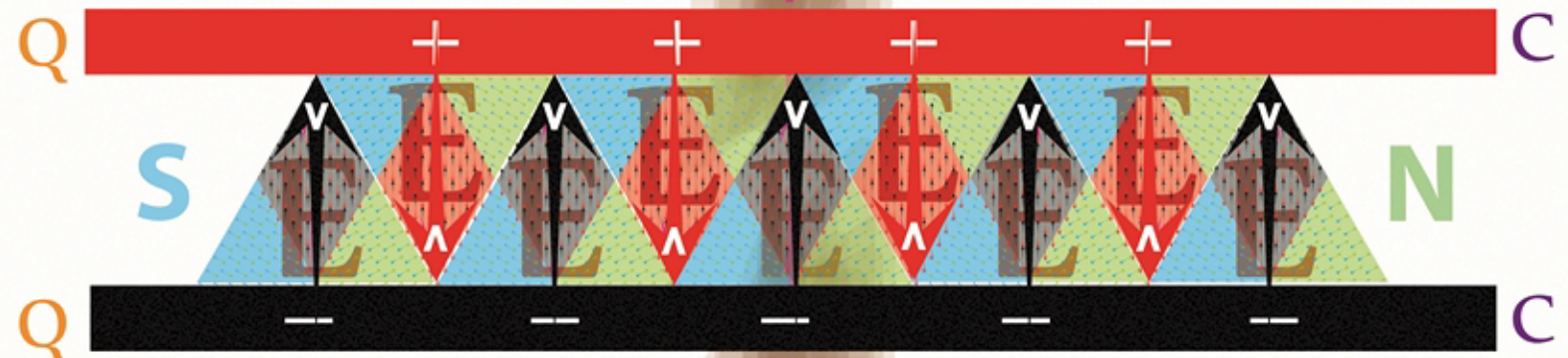
A capacitor is a passive two-terminal AC electrical component
used to store alternating electrical energy in an electric field.
It blocks the block of direct currents.

Changing Magnetic fields
create
changing Electric fields

Capacitors store & pass electrical energy as charged 2D masses

Capacitors store EM Energy
as transverse Bosons

Capacitors store charged
masses between their plates



Charged Matter [current] does not
flow between the plates
of a Capacitor

ODD.hv charge

A common form of energy storage device is a parallel-plate capacitor whose capacitance is directly proportional to the surface area of the conductor plates and inversely proportional to the separation distance between the plates.

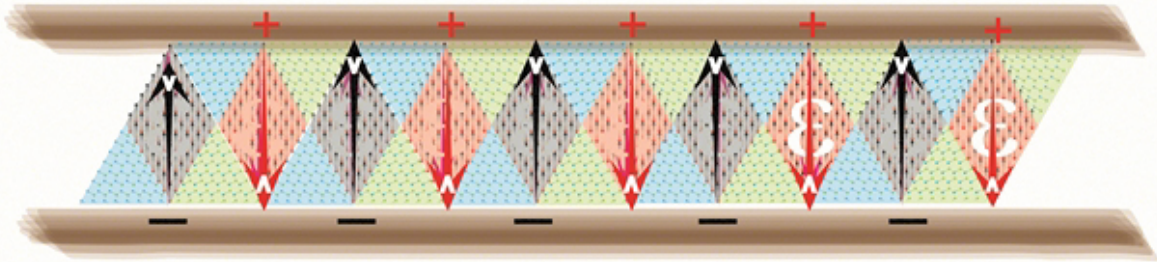
volts hv^2

Capacitance

Capacitance

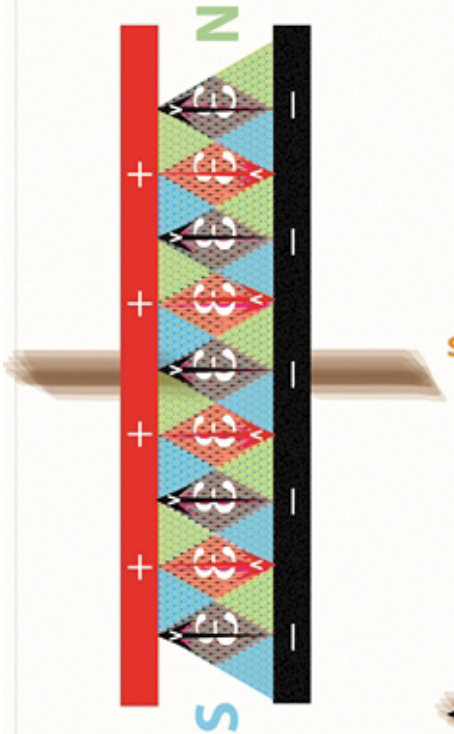
The SI unit of capacitance is the farad (symbol: F), named after the English physicist Michael Faraday

In general any separated charges will create a emf voltage

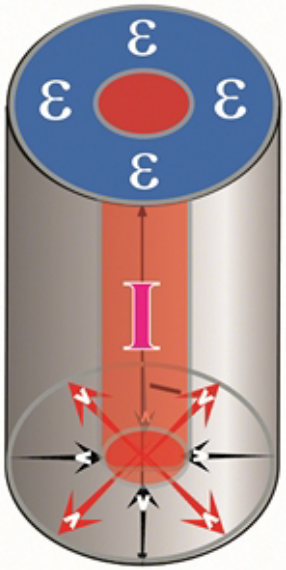


Any two electrical conductors separated by a non-conducting (or very high resistance) medium is a capacitor
[these can be plates, conductive wires or coaxial cables etc]

Plate capacitors



Coaxial cables



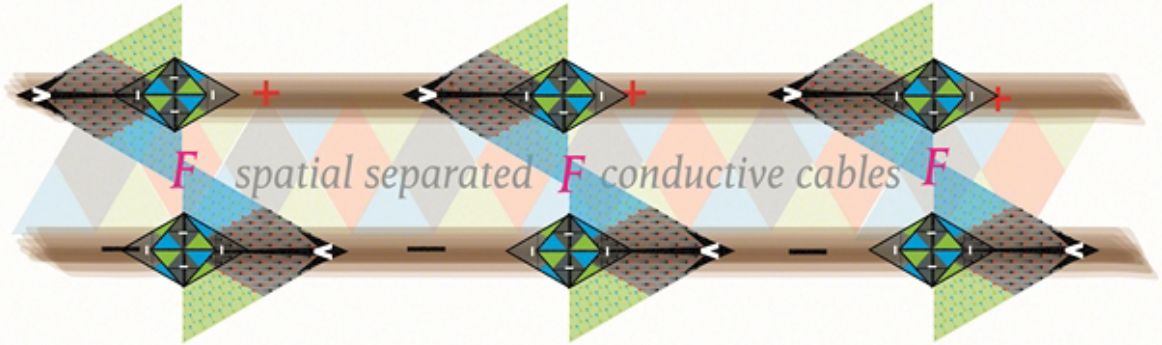
Capacitance is the ability of a body to store an electrical charge.

$$C = \frac{Q}{V}$$

Any object that can be electrically charged exhibits capacitance

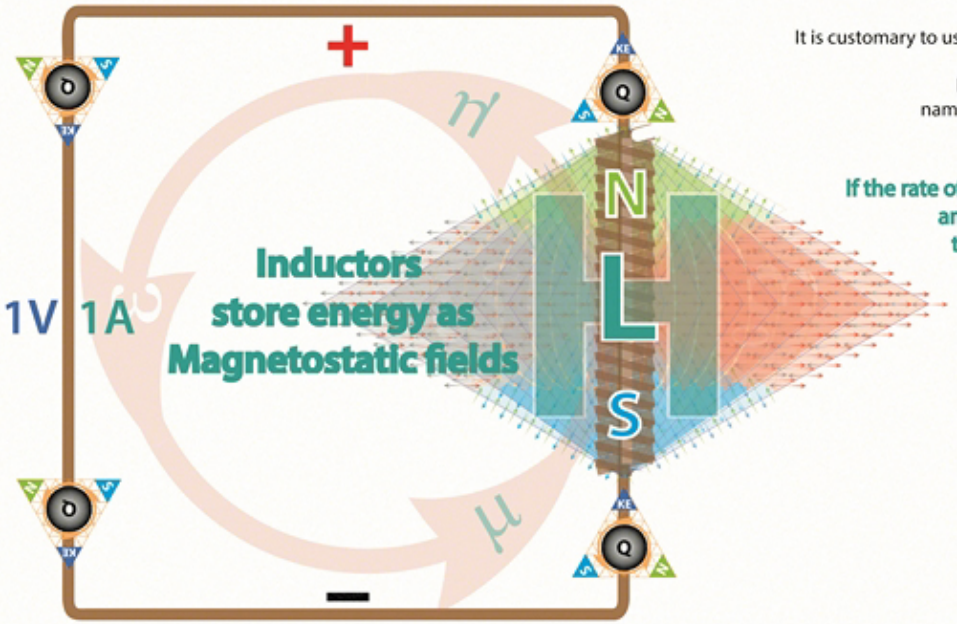
A 1 farad capacitor when charged with1 coulomb of electrical charge will have a potential difference of 1 volt between its plates.

should a current flow in the conductors the capacitive field will be dominated by orthogonal, superpositioned Amperian M-fields of greater strength



Capacitance is a function only of the physical dimensions (spatial geometry) of conductors and the permittivity of the dielectric separating them

Inductive and Capacitive energy storage



It is customary to use the symbol L for inductance, in honour of the physicist Heinrich Lenz.

In the SI system the unit of inductance is the Henry, named in honor of the scientist who discovered inductance, Joseph Henry.

If the rate of change of current in a circuit is one ampere per second and the resulting electromotive force is one volt, then the inductance of the circuit is one henry

$$v_m = \sum_{n=1}^{K} L_{m,n} \frac{di_n}{dt}.$$

The voltage across an inductor is equal to the product of its inductance and the time rate of change of the current through it

Joseph Henry

[17 December 1797 – 13 May 1878]

Michael Faraday

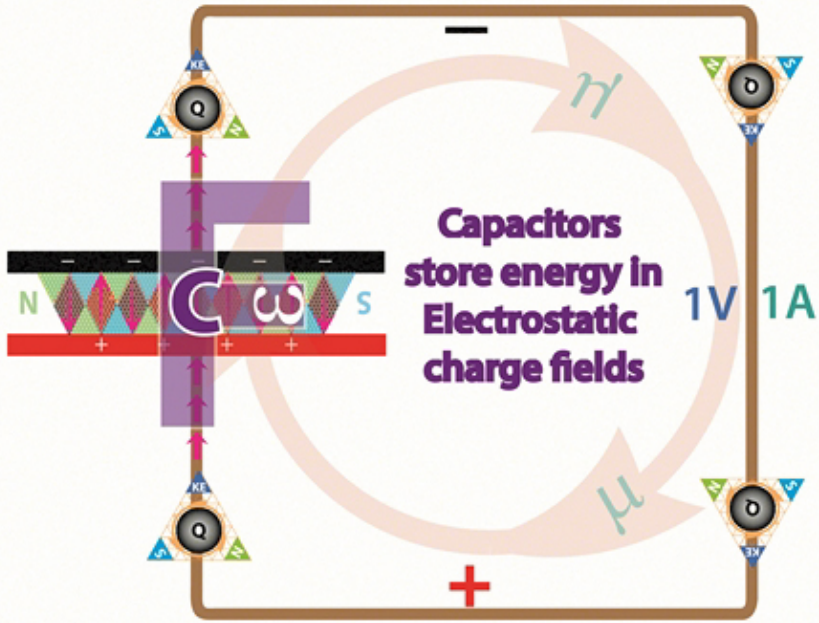
[22 September 1791 – 25 August 1867]

The SI unit of capacitance is the farad (symbol: F), named after the English physicist Michael Faraday

a 1 farad capacitor when charged with 1 coulomb of electrical charge will have a potential difference of 1 volt between its plates.

$$W_{\text{stored}} = \frac{1}{2}CV^2 = \frac{1}{2}\varepsilon_r\varepsilon_0\frac{A}{d}V^2.$$

Capacitance is the ability of a body to store an electrical charge. Any object that can be electrically charged exhibits capacitance.



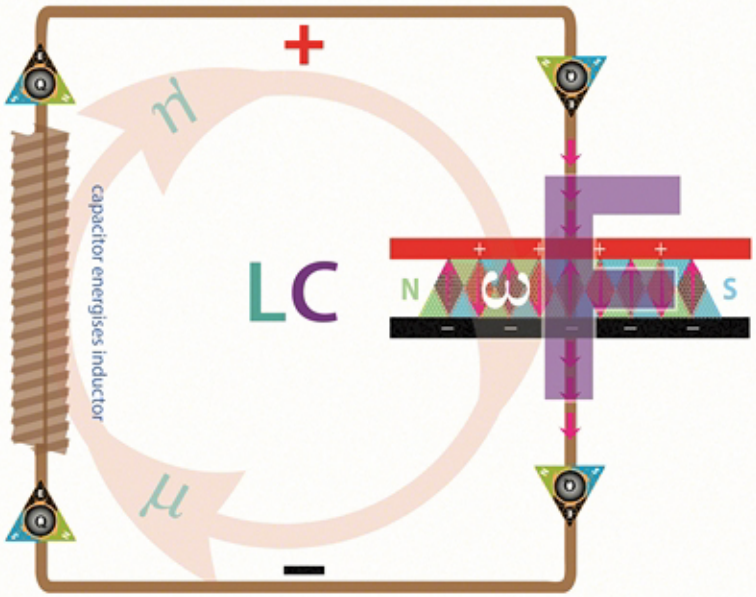
Inductive - Capacitive circuits

An LC circuit, also called a resonant circuit, tank circuit, or tuned circuit,
consists of an inductor, represented by the letter L,
and a capacitor, represented by the letter C.

LC

When connected together, they can act as an electrical resonator,
an electrical analogue of a tuning fork, storing energy
oscillating at the circuit's resonant frequency

These LC circuits are idealised models
assuming there is no dissipation of energy due to resistance over time,
with the circular EM vectors representing electron current flow in the circuit
and its translation between inductive and capacitive forms of energy storage.



**If a charged capacitor is connected across an inductor,
charge will start to flow through the inductor,
building up a magnetic field around it and
reducing the voltage on the capacitor.**

**Eventually all the charge on the capacitor will be gone
and the voltage across it will reach zero.**

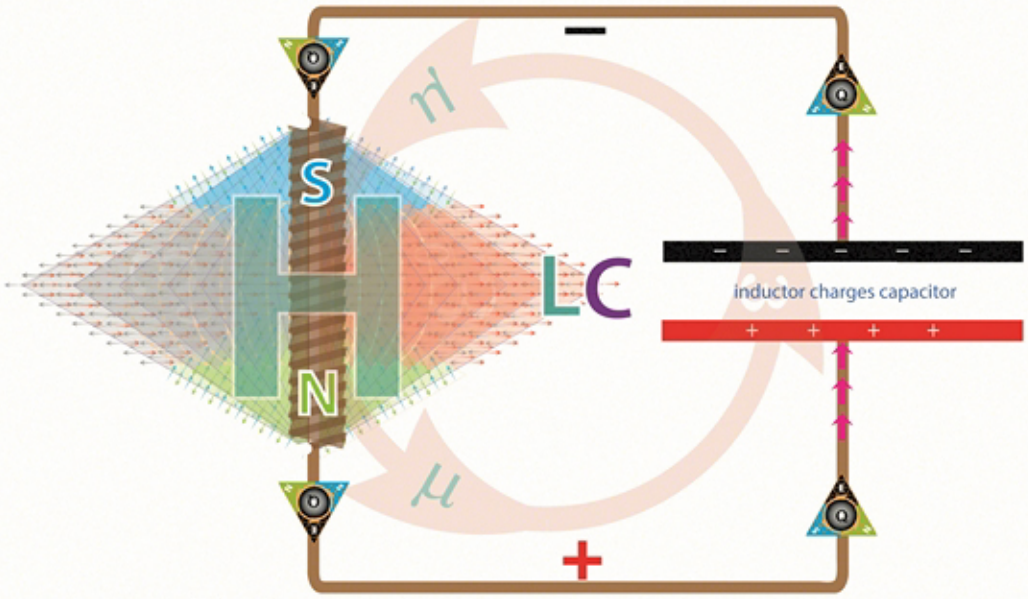
**However, the current will continue,
because inductors resist changes in current.**

**The energy to keep it flowing is extracted from the magnetic field,
which will begin to decline.**

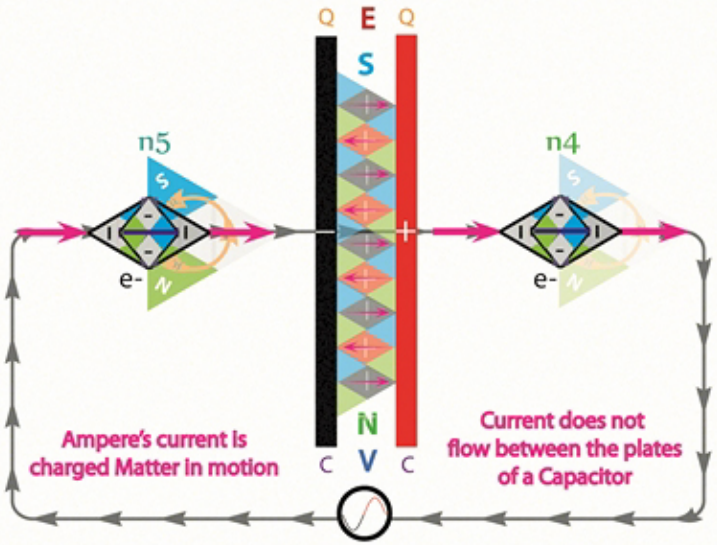
**The current will begin to charge the capacitor
with a voltage of opposite polarity to its original charge.**

**When the magnetic field is completely dissipated the current will stop
and the charge will again be stored in the capacitor,
with the opposite polarity as before.**

**Then the cycle will begin again,
with the current flowing in the
opposite direction through the inductor.**

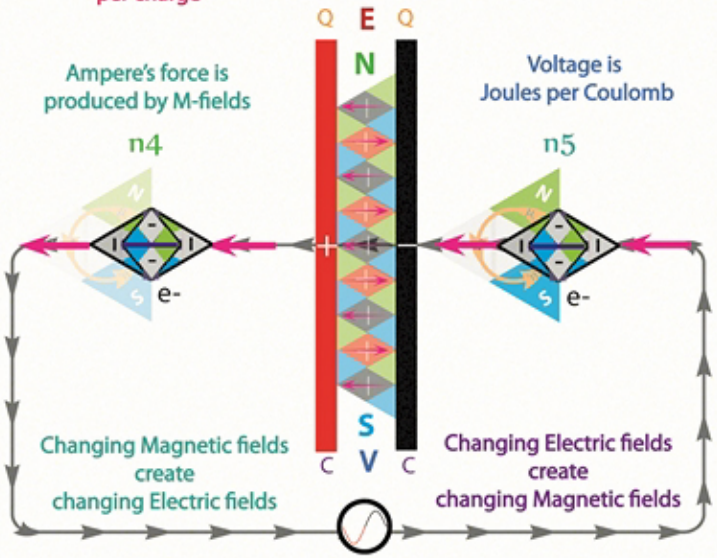


Capacitors store EM Energy as transverse Bosons



Capacitors store Energy as Joules per charge

Capacitors store & pass energy as charged masses



Capacitors store charged masses between their plates

Displacement Current

Maxwell's displacement current is better termed a 'displacement voltage' in light of the fact the charged Matter does not move/flow between the charged plates of a capacitor only the charged mass-energies.

Changing Electric fields produce changing Magnetic fields and vice versa as a direct result of their respective E&M field geometries within the Planck quanta of EM fields

$$\nabla \times \mathbf{B} = \epsilon_0\mu_0 \frac{\partial \mathbf{E}}{\partial t} + \mu_0 \mathbf{J},$$

As opposed to Maxwell's view of a 'stretching ether' that stores energy between the capacitive plates

As the energy content of a charge increases so does its voltage

Equilateral energy momenta is stored compressively in the inductive quantum fields [ZPF] as it increases, and is released via charged exchange W-Bosons

Producing a capacitive region of ElectroMagnetic fields and stress energies

Bosons are transverse stores of energy momenta

$$\mathbf{J}_D = \epsilon_0 \frac{\partial \mathbf{E}}{\partial t}$$

'Displacement Currents' between charged surfaces are produced by a increasing Electric Field component that seeks equilibrium

It must be carefully borne in mind that we have made only one step in the theory of the action of the medium. We have supposed it to be in a state of stress, but we have not in any way accounted for this stress, or explained how it is maintained. This step, however, seems to me to be an important one, as it explains, by the action of the consecutive parts of the medium, phenomena which were formerly supposed to be explicable only by direct action at a distance.

Maxwell - On Physical Lines of Force (1861)

mass

$$\frac{E}{c^2} = m$$

mass-energy momenta in a 2D equilateral geometry

Radiant waveform
EM mass-energies

$$mc^2 = E = Mc^4$$

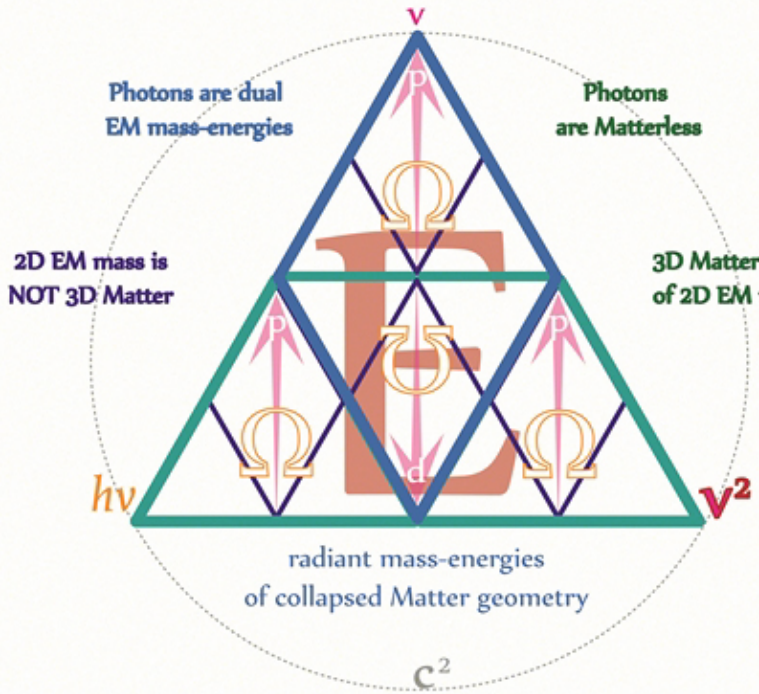
A clear geometric distinction can now be made between **EM mass geometries** and standing wave **Matter topologies**

Matter

$$M = \frac{E}{c^4}$$

Four mass-energy momenta in a 3D tetrahedral topology

Standing waveform
EM energies



$$n\pi_{mass}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

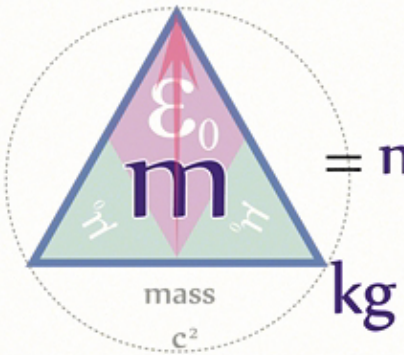
EM Field · Planck quanta
ElectroMagnetic · mass · velocity

$$T\pi_{Matter}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta
ElectroMagnetic · mass · velocity

ρ/second

ρ/second^2



$$= m\Omega\left[\frac{v^2}{c^2}\right]$$

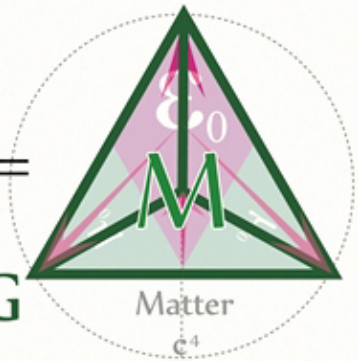
kg

Radiant EM masses

$$\frac{4\pi m}{c^2} = M$$

Standing-wave mass-Matter

$$m\Omega\left[\frac{v^2}{c^4}\right] =$$



KG

massless particles are a scientific misnomer and massless must now be re-termed Matterless

de Broglie Matter-waves

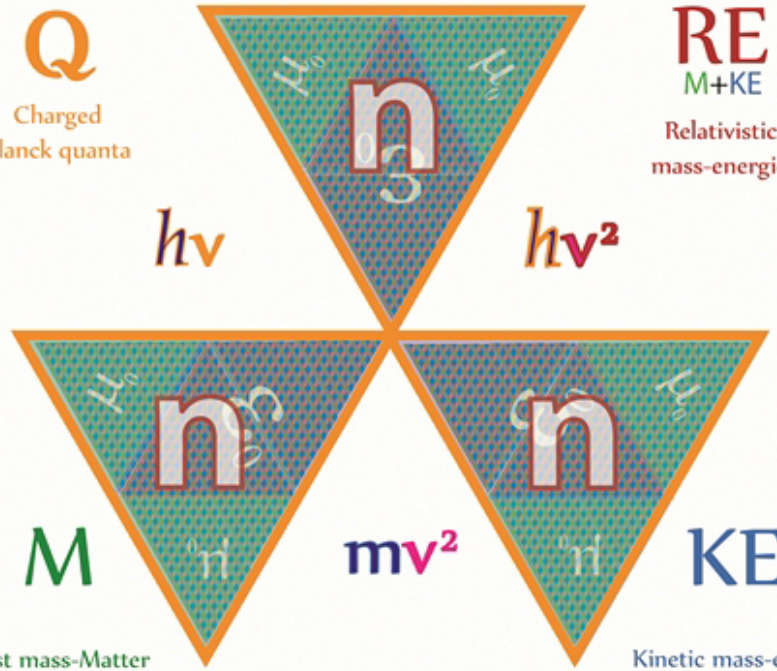
EM CHARGE
provides the foundational
interaction geometry for
all mass & Matter

In quantum mechanics, a Matter wave or de Broglie wave is the probabilistic electromagnetic quantum wave-form created by the Planck elements constituting Matter

Relativistic mass-energy
is the total sum of all Planck
energy momenta in any
spatial co-ordinate
system

Q
Charged
Planck quanta

RE
M+KE
Relativistic
mass-energies



All EM waves and Matter are made up of integral Planck quanta [any imbalance results in Charge] as the number of Planck quanta increases their associated wavelengths decrease

The relativistic stress tensor mass-energies of Matter in motion is the sum of its standing-wave mass-Matter topologies and its Lorentz corrected kEM field mass-energy geometries

M
rest mass-Matter
topologies

KE
Kinetic mass-energy
geometries

3D MATTER
is the charged topology
created by standing-waves
of 2D mass-energies

Kinetic EM mass-energy levels depend on the velocity of the Matter particle in motion
[in Matter energy travels in a standing wave at the speed of Light]

Kinetic EM fields
are the mass-energy
fields created by
Matter in motion

The rest mass-energy geometries comprising all Matter topologies are velocity invariant

Material EM masses

deBroglie wavelength & Compton frequency

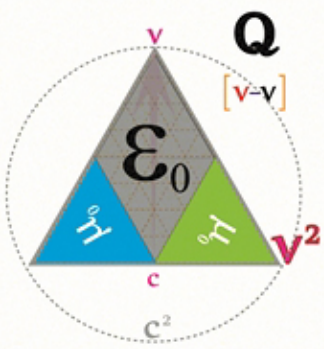
λ v^2

Any increase in Energy quanta results in
a decrease in EM mass quanta wavelengths

In Matter all energy propagates at c

$$mv^2 = E = hv^2$$

in Standing wave Matter
v=c

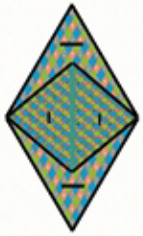


Number of Quanta comprising rest Matter

Compton Frequency

$$\frac{mc^2}{h} = 1 \times 10^{19}$$

Electron Compton Frequency
$= 1.2 \times 10^{20}$ quanta



v^2

Wavelength of Quanta comprising rest Matter

de Broglie wavelength

$$\frac{h}{mc} = 2.99792456 \times 10^{-11}\ \text{m}$$

Electron de Broglie wavelength
$= 4.002769142 \times 10^{-11}$ m

λ

Linear momentum of standing wave Energy comprising Matter

Intrinsic Particle Momenta

$$mc = 2.211340633 \times 10^{-23}\ \text{Ns}$$

Intrinsic Electron momenta
$= 2.95253793 \times 10^{-19}$ Ns

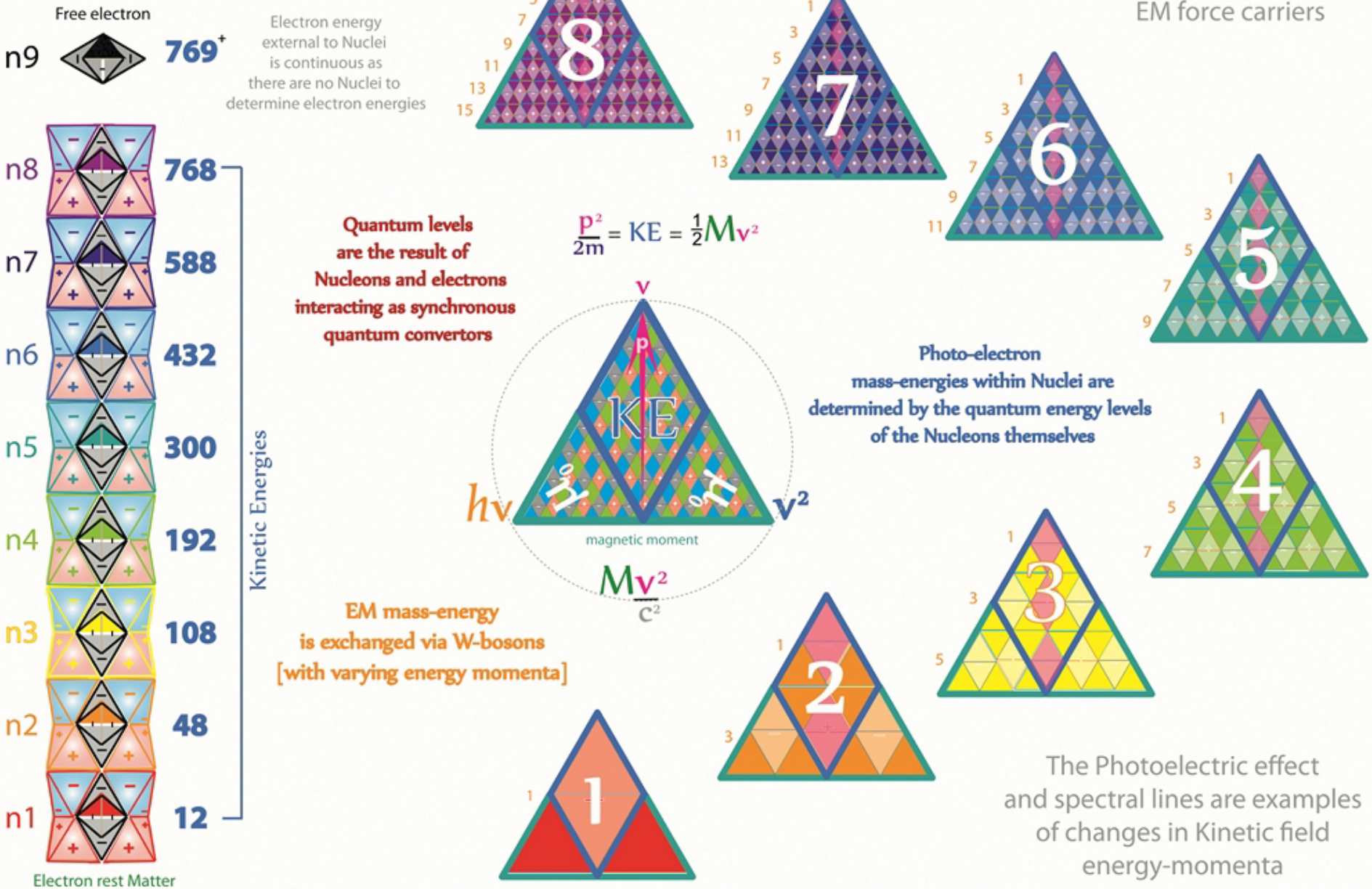
p

The Compton frequency, deBroglie wavelength and Energy momenta of any physical system are all related through the speed of Energy [c]

The examples above are for stationary Electrons any motion will NOT affect the results for the electron itself (however a extended KEM field will be produced by the motion and its properties will be affected by changes in velocity)

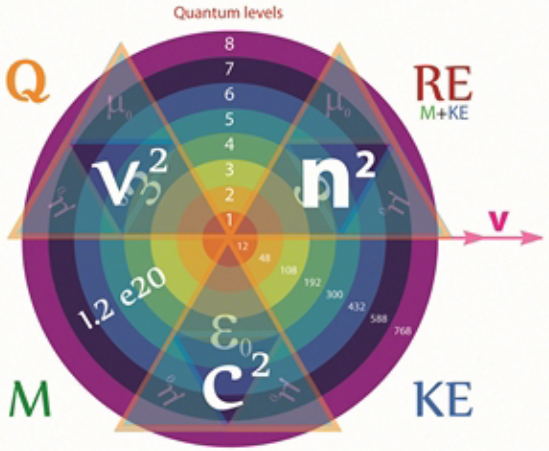
In Lorentz invariant Matter the standing wave Energy always propagates at the speed of Light [c] (with the KEM field subject to Lorentz corrections)

KEM Quantum levels



deBroglie relationships

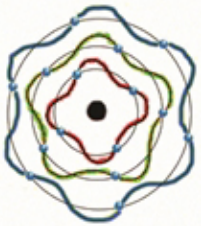
*" The electron which is moving in a sine wave circular path,
will repeat the same sine wave path in each successive orbit.
The sine wave paths in consecutive orbits will exactly overlap.
The electron wave reconnects with itself and is in phase with itself. "*



rest mass-Matter is
velocity invariant

An electron bound in a atomic nuclei will trace
a toroidal path around the nuclei mapped
by the sine wave motion of any point
on its charged geometric surface

$$\lambda = \frac{h}{p}$$



$$f = \frac{E}{h}$$

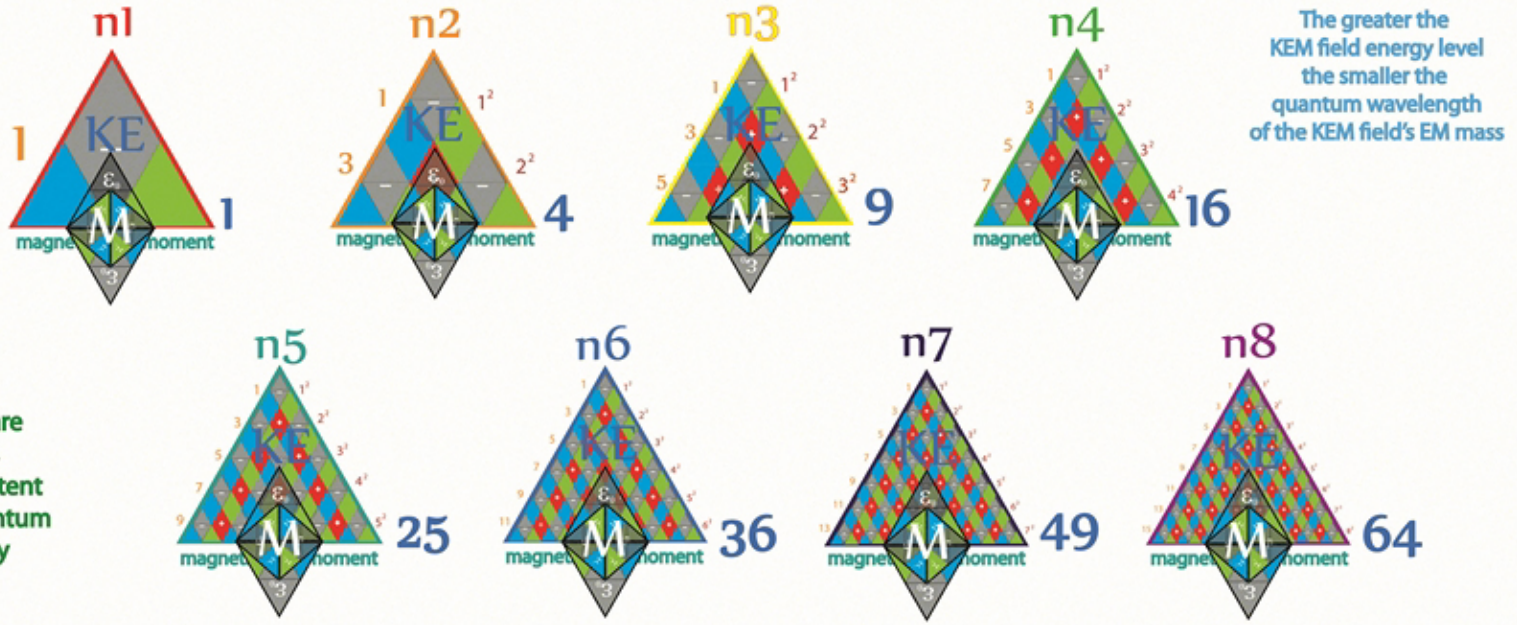
Louis de Broglie

(15 August 1892 – 19 March 1987)

***The relativistic energy of Matter in motion
is a measure of its standing wave mass-energies,
and the object's velocity related kinetic energy and
magnetic moment in the form of a KEM wave geometry***

$$p = \frac{h}{\lambda} = \frac{h}{2\pi}\frac{2\pi}{\lambda} = \hbar k$$

Although Mathematically correct
the illustrative model commonly used to
depict the deBroglie relationships
is incorrect



The greater the
KEM field energy level
the smaller the
quantum wavelength
of the KEM field's EM mass

All mass-Matter topologies are
Lorentz velocity invariant,
only the EM mass-energy content
and quantised angular momentum
of the Kinetic EM fields vary

Electron Positions in Atomic Orbitals

Werner Heisenberg

(5 December 1901 – 1 February 1976)

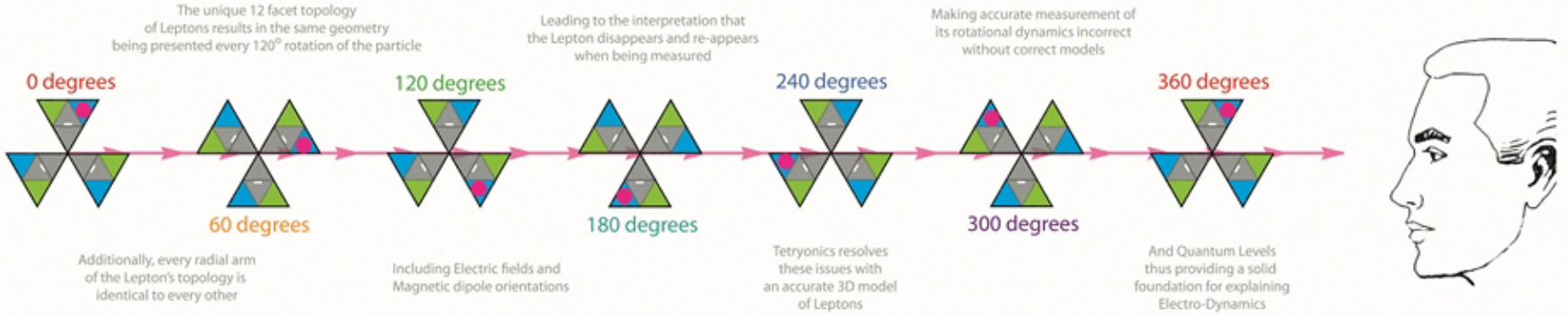
Erwin Schrödinger

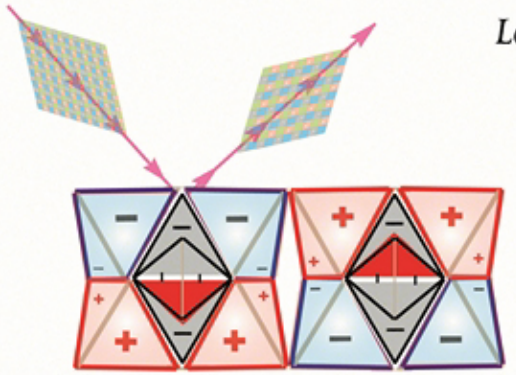
(12 August 1887 – 4 January 1961)

Atomic orbitals are typically described as "hydrogen-like" (meaning one-electron) wave functions over space, categorized by n, l, and m quantum numbers, [as covered in Tetryonic Chemistry] which correspond to the electron's energy, angular momentum, and an angular momentum vector component, respectively

Using Tetryonics as a EM field model, an electron's position and velocity CAN be modelled simultaneously (but any attempt to measure or interact with it, will affect its energy levels)

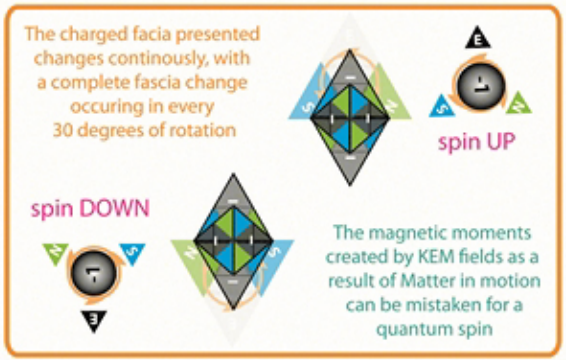
Quantum Mechanics is a statistical [mathematical] representation of equilateral, charged geometries and EM energy interactions





Leptons are 6 loop quantum loop inductive rotors

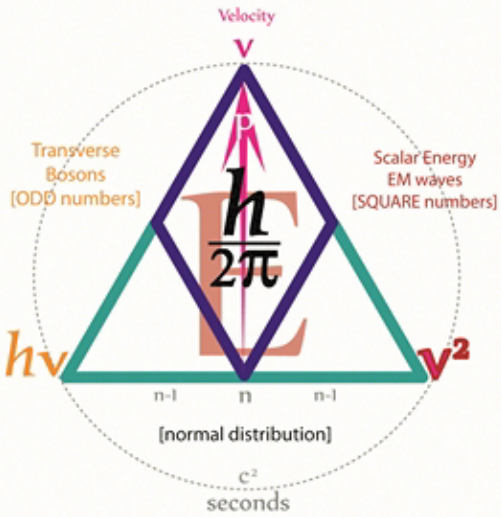
Lepton's are Spin 1 particles that can easily be misinterpreted as 1/2 or 3 quantum spin numbers without the correct physical models to interpret physcical observations on

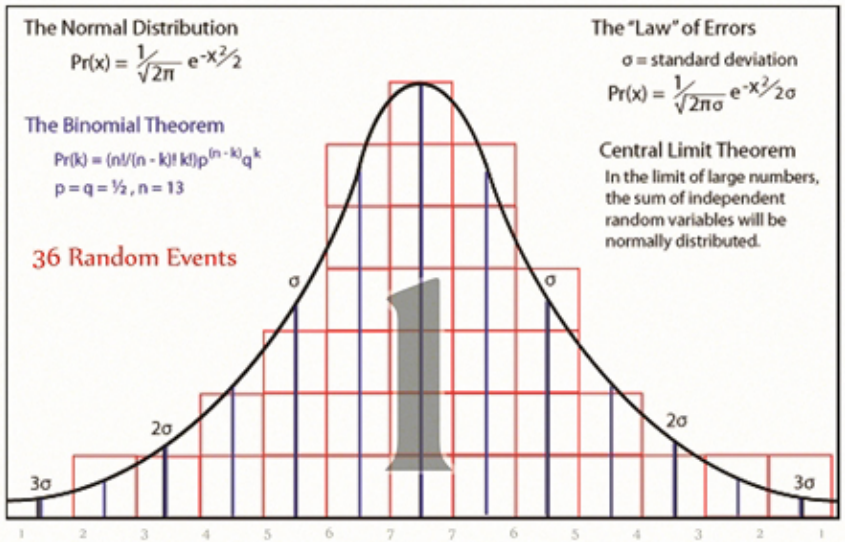


Distributions and Uncertainty

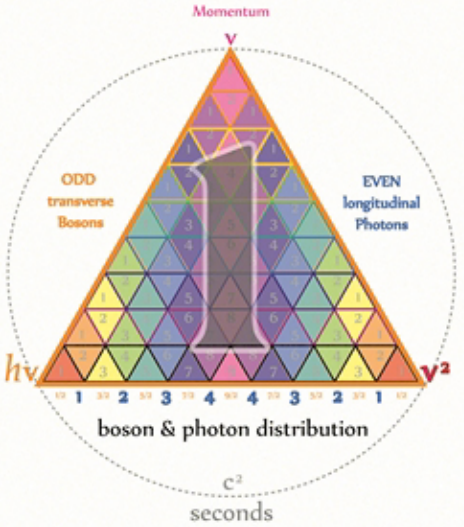
A Bell Curve (Normal Distribution) is a mathematical reflection of the integral Planck mass-energy momenta quanta distributions found in all equilateral charge geometries

Probabilities are the square of the Amplitude





All probabilities are re-normalisable and sum to Unity



All Matter and EM fields are comprised of equilateral mass-energy momenta and any attempt to measure the system involves the introduction of additional Planck EM quanta into the systems

John Stewart Bell

(28 June 1928 – 1 October 1990)

No physical theory of local hidden variables can reproduce all of the predictions of quantum mechanics.

WRONG

$$\Delta p \, \Delta x \geq \frac{1}{2} \hbar$$

Quantum uncertainty formulation

$$\Delta E \, \Delta t \geq \frac{1}{2} \hbar$$

The more precisely the position is determined, the less precisely the momentum is known in this instant, and vice versa.

Heisenberg, uncertainty paper, 1927

WRONG

Werner Heisenberg

(5 December 1901 – 1 February 1976)

Chance is closely related to the ideas of uncertainty and indeterminacy.
Uncertainty today is best known from Werner Heisenberg's principle in quantum mechanics.
It states that the exact position and momentum of an atomic particle can only be known within certain limits.
The product of the position error and the momentum error is equal to a multiple of Planck's constant of action.
This irreducible randomness in physical processes established the existence of chance and indeterminism in physics

Leptronic Self-energies

As the velocity of a charged particle increases
the energy level of its KEM field increases

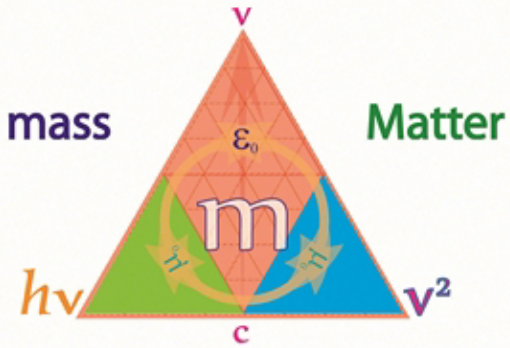
KEM field $\frac{4n\pi}{c^2}$ Energy [Planck quanta $[m\Omega v^2]$ mass velocity] momenta

mass

radiant energy per second

E/c^2

KEM field geometries generated as a product of Matter in motion are Lorentz variant



Quantum inductive loops resist changes to energies contained in their equilateral energy fields [inertial mass]

Matter $\frac{4n\pi}{c^4}$ Energy [Planck quanta $[m\Omega v^2]$ mass velocity] momenta

Matter

standing-wave energy per second squared

E/c^4

rest mass-Matter topologies are not affect by changes in velocity [Matter is Lorentz invariant]

The Law of Interaction

The Energy momenta of an electron's KEM field
polarises the region surrounding its Matter
and creates fields of interaction through
the super-positioning of these fields

a particle's self-energy represents the contribution to the particle's energy,
or effective mass, due to interactions between the particle and the system it is part of.

$KEM = Mv^2$

All Matter topologies are made up of quantum inductive loops which extract energy from any EM field they move through

Matter stores energy in its 3D planar facsia as charged mass-energy

additional to creating the familiar laws of interaction
[opposite attract - similars repel]
the KEM fields of leptons can act as tuned antennas
extracting energy from their environment

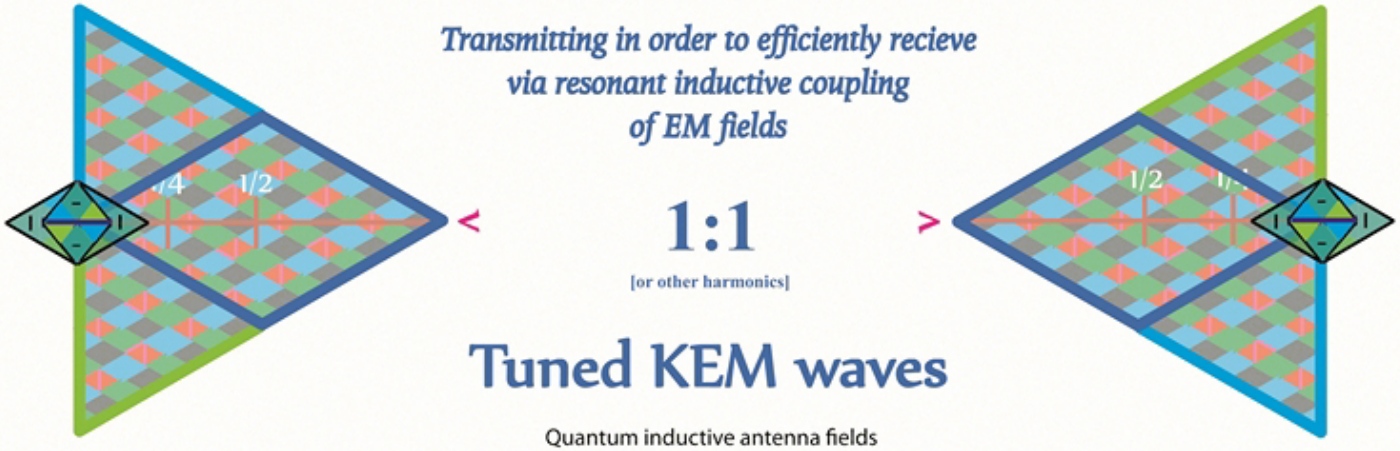
KEM fields store energy in their 2D planar EM field as neutral divergent mass-energies

$E = Mc^4$

All Matter contains EM energy propagating in a standing wave topology at the speed of light (the source of inertial mass)

Resonant EM fields

Transmitting in order to efficiently recieve
via resonant inductive coupling
of EM fields



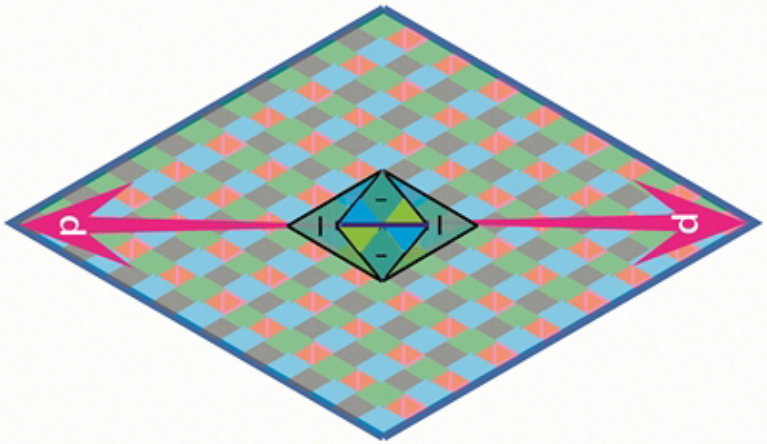
Tuned KEM waves

Quantum inductive antenna fields

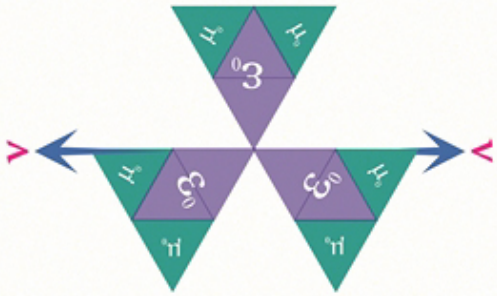
Historically, all recieiving antennas have been mechanically tuned to match the sought EM wavelength
But if power is applied to a small wavelength electrostatic topology it creates a KEM field
that produces a much larger, tuned rhombic antenna field

EM waves are hf geometries

Electron's rest Matter
stores EM mass-energy
in a standing wave



EM bosons have $h\nu$ geometries



Electrostatic particles of Matter
have dual KEM energy fields that
can act as resonant antennas

Bosons

All Light is made of transverse EM energy Quanta

$$1\pi_{\text{Bosons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta · ElectroMagnetic · mass · velocity

James Clerk Maxwell

$$\nabla\cdot\mathbf{D}=4\pi\rho$$

$$\nabla\times\mathbf{H}=\frac{4\pi}{c}\mathbf{J}+\frac{1}{c}\frac{\partial\mathbf{D}}{\partial t}$$

$$\nabla\times\mathbf{E}+\frac{1}{c}\frac{\partial\mathbf{B}}{\partial t}=0$$

$$\nabla\cdot\mathbf{B}=0$$

ElectroMagnetic waveforms propagate at the speed of light

Photons

All Light consists of longitudinal harmonic oscillators

$$2\pi_{\text{Photons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta · ElectroMagnetic · mass · velocity

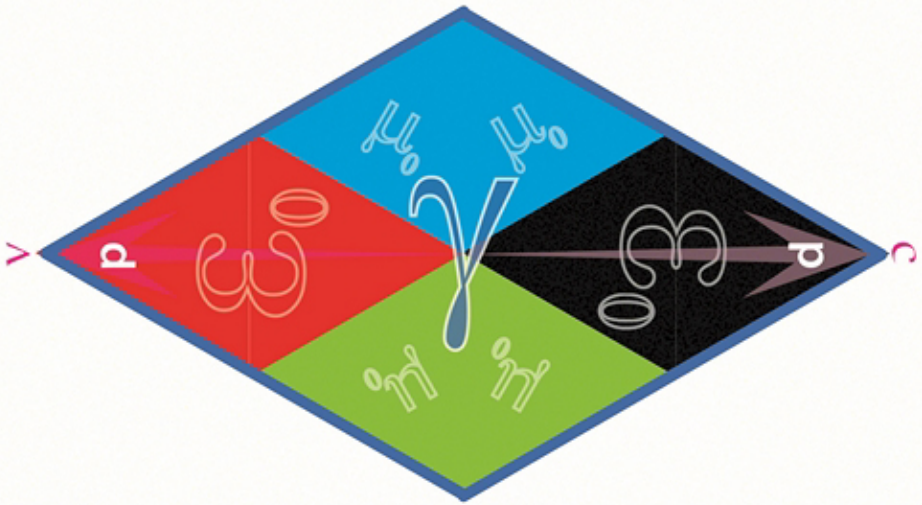
Energy is quantised

Max Planck

$$E = n.h\nu$$

All Photons have mass-Energy and momentum

$$\lambda=\frac{h}{p}=\frac{h}{mv}\sqrt{1-\frac{v^2}{c^2}}$$



Matter is a probabilistic wave of EM particles

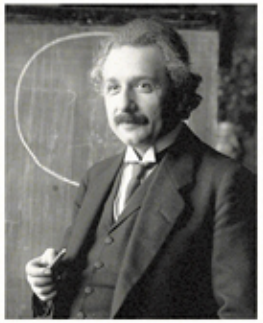
p

Louis de Broglie

Erwin Schrodinger

Ψ

Photons are particles



Albert Einstein

$$E = hf$$

All EM waves and Matter exhibit a Wave-Particle duality

$$i\hbar\frac{\partial}{\partial t}\Psi=\hat{H}\Psi$$

Photonic EM fields

In 1865, James Clerk Maxwell's prediction that light was an electromagnetic wave, [which was confirmed experimentally in 1888 by Heinrich Hertz's detection of radio waves], seemed to be the final blow to particle models of light.

$$2\pi_{\text{Photons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field (ElectroMagnetic) · Planck quanta · mass · velocity

James Clerk Maxwell

(13 June 1831 – 5 November 1879)

$$8.8541e\text{-}12$$

$$\frac{F}{m}\ \varepsilon_0\ \frac{A^2 s^4}{kg\, m^3}$$

$$Q \quad 4\pi\varepsilon_0 \quad Q$$

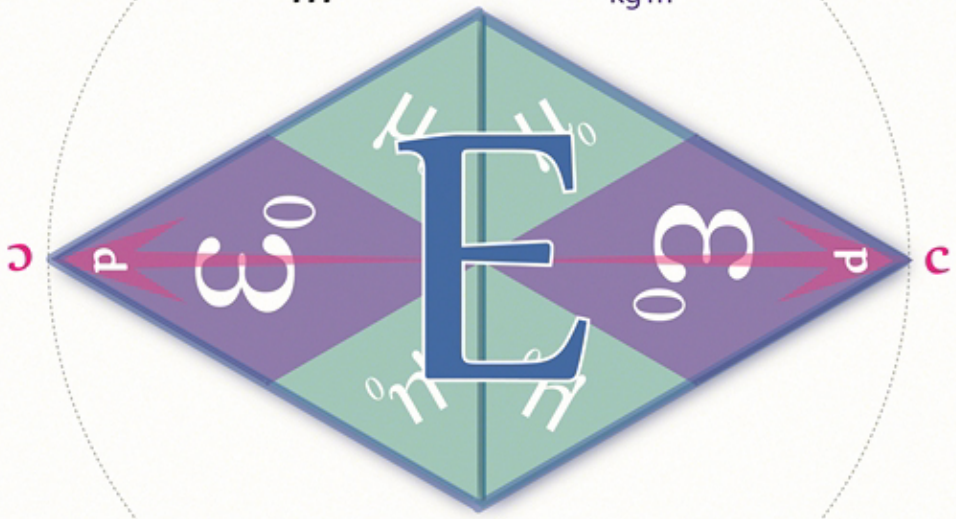
$$E = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$$

$$\frac{K_E}{K_M} = 9e16\ \frac{\frac{N m^2}{C^2}}{\frac{N s^2}{C^2}}$$

$$c^2 = 9e16\ \frac{m^2}{s^2}$$

$$c = 299{,}792{,}458\ \frac{m}{s}$$

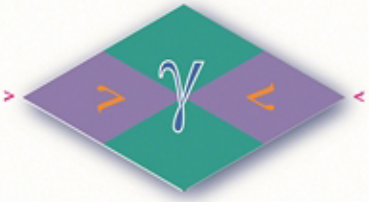
The speed of light can be calculated using the Electric and Magnetic constants



$$\frac{H}{m}\ \mu_0\ \frac{kg\, m}{A^2 s^2}$$

$$[4\pi]e\text{-}7$$

All EM mass-energy momenta propagates bi-directionally at c [the speed of light] in a vacuum



Electric field strength

The strength of Electric fields is determined by the Electrical Permittivity Constant

$$\varepsilon_0\mu_0 = \frac{1}{c^2}$$

The strength of Magnetic fields is determined by the Magnetic Permeability Constant

$$B = \mu_0 H$$

The ElectroMagnetic field geometry of Photons

$$2mv^2 = KE = hf$$

$$2\pi_{\text{Photons}}\left[\left[\varepsilon_0\mu_0\right].\left[\underset{\text{momenta}}{h\nu^2}\right]\right]$$

EM Field — Energy

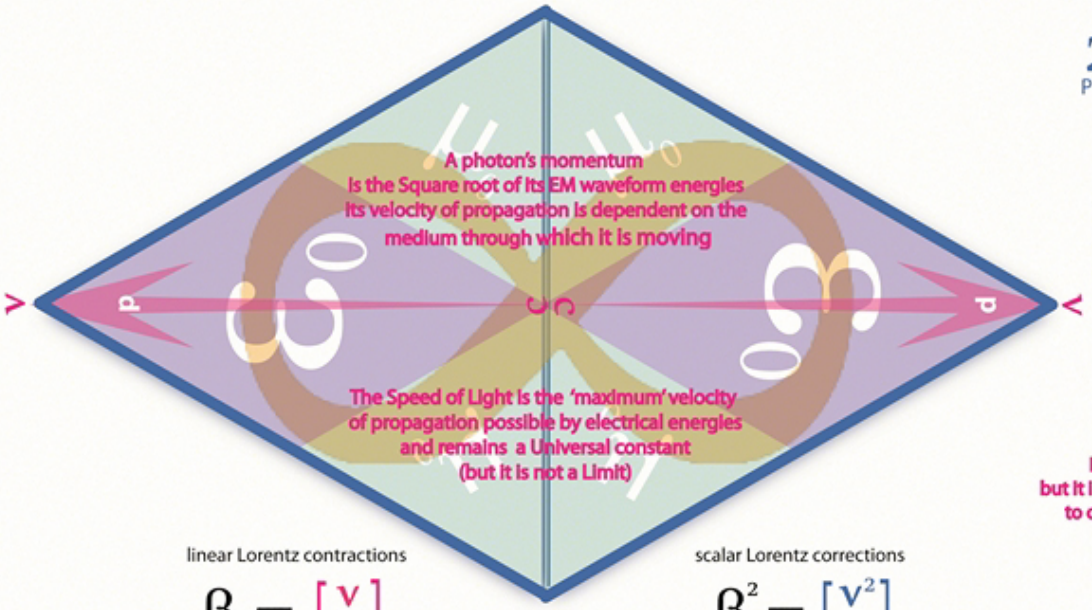
Matter is comprised entirely of equilateral electromagnetic energies

$$4n\pi_{\text{Matter}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field — Planck quanta

ElectroMagnetic mass velocity

Matter topologies contain standing-wave EM mass-energies moving at the speed of light



Photons are diamond geometry ElectroMagnetic mass-energies

$$2\pi_{\text{Photons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega 0^2\right]\right]$$

EM Field — Planck quanta

ElectroMagnetic mass velocity

Light cannot have zero velocity or stand still but it is possible (against Einstein's thought experiment) to catch up to a photon and observe its waveform

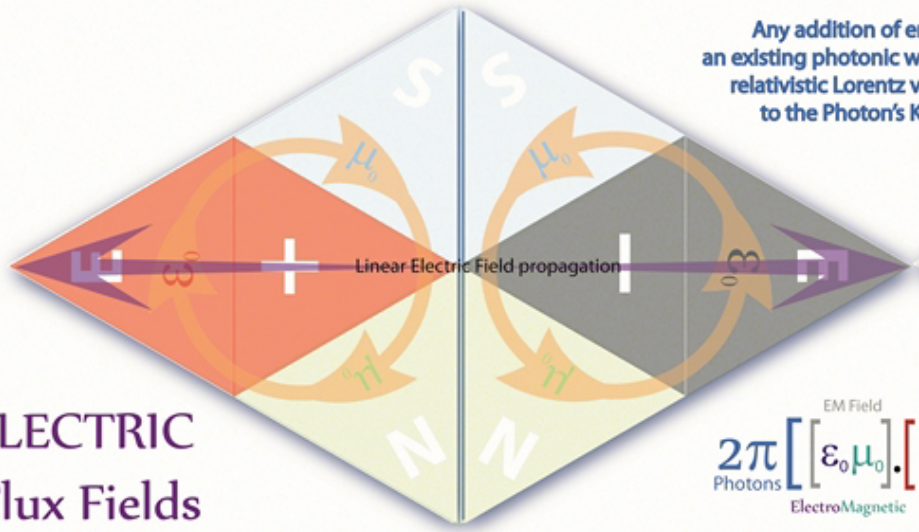
linear Lorentz contractions

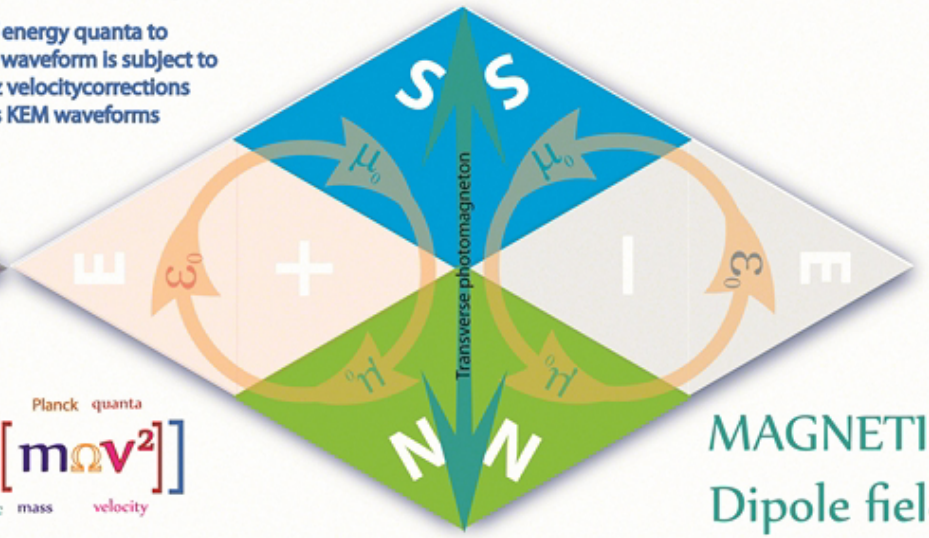
$$\beta = \left[\frac{v}{c}\right]$$

scalar Lorentz corrections

$$\beta^2 = \left[\frac{v^2}{c^2}\right]$$

Any addition of energy quanta to an existing photonic waveform is subject to relativistic Lorentz velocitycorrections to the Photon's KEM waveforms





ELECTRIC Flux Fields

$$2\pi_{\text{Photons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field — Planck quanta

ElectroMagnetic mass velocity

MAGNETIC Dipole fields

Photons and Charge bosons

Photons are dual [2π]
neutral charge quanta

$$2\pi_{\text{Photons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field (ElectroMagnetic) · Planck quanta (mass, velocity)

Their Electric and Magnetic
fields are orthogonal to each other

**Bosons are transverse charge carriers
they combine to create ElectroMagnetic
photons which are longitudinal charge carriers**

They propagate
in differing mediums
at v/c

$$\text{EVEN}\,\pi_{\text{EM waves}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field (ElectroMagnetic) · Planck quanta (mass, velocity)

nπ electromagnetic waves are comprised of
numerous 2π photons of the same wavelength
(save in superpositioned states - White light)

Photons are dual Boson waveforms

$$E = 2h\nu$$

$$E = hf$$

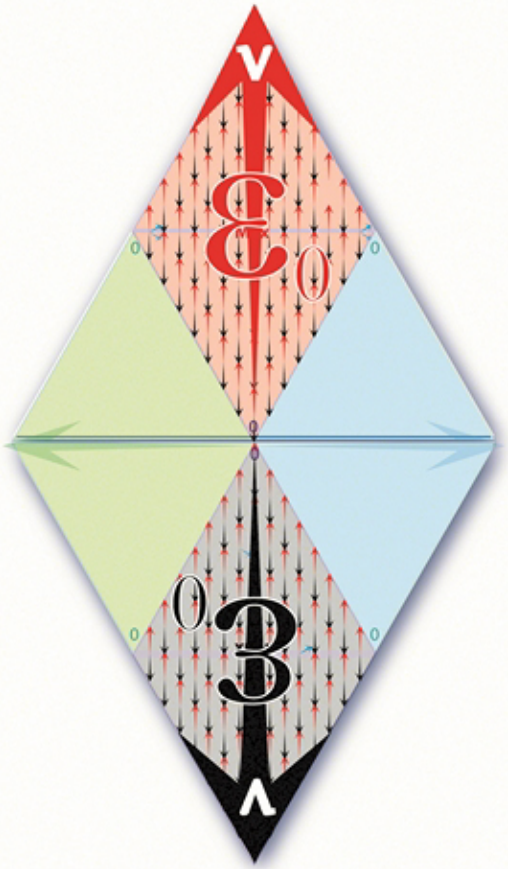
**A moving charge creates a magnetic field throughout space
that is perpendicular to the direction of motion.**

**Photons require NO ether to propagate
they are discrete bundles of EM energy-momenta**

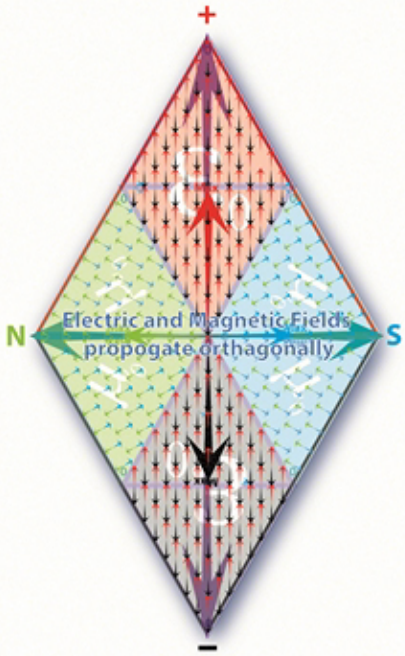
**Similarly, a magnet has an intrinsic neutral electric field
that is perpendicular to its Magnetic Dipole.**

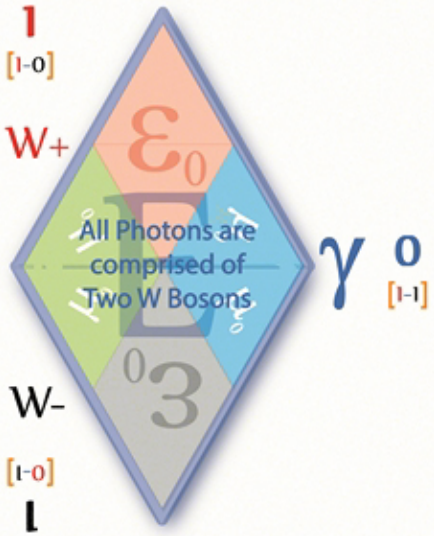
Photon EM strength vectors

Electric field force vectors

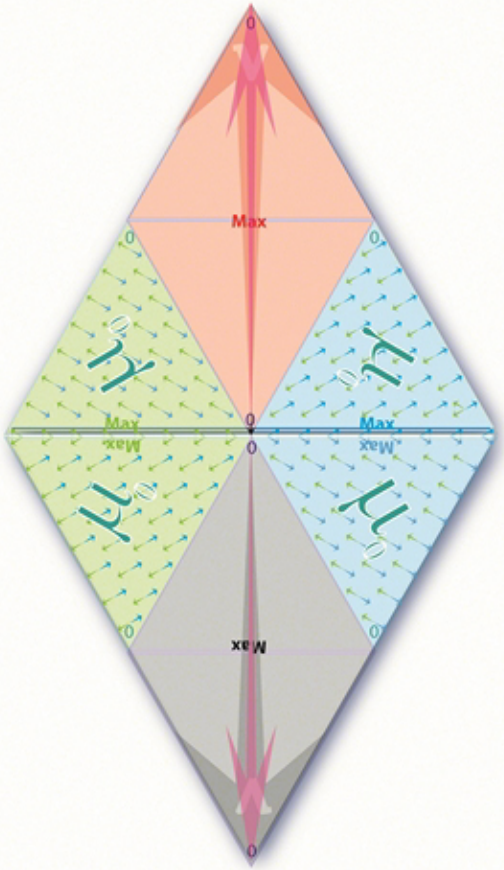


When E field flux is at Maximum
B field flux is at Minimum

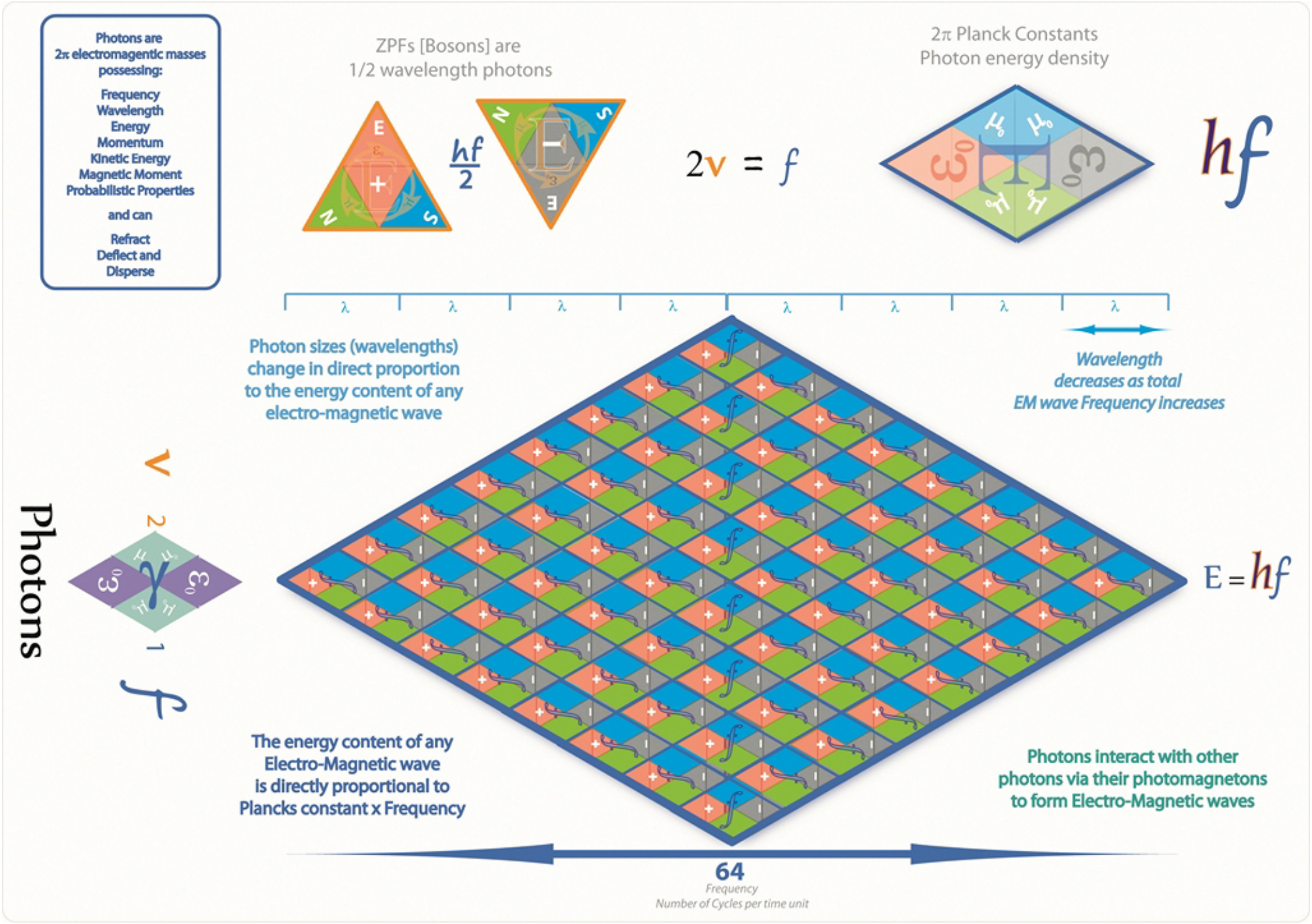




Magnetic field force vectors



When B field flux is at Maximum
E field flux is at Minimum



Bosons in a EM wave

EM waves are comprised of transverse W Bosons

Odd numbers totaling to a Square number

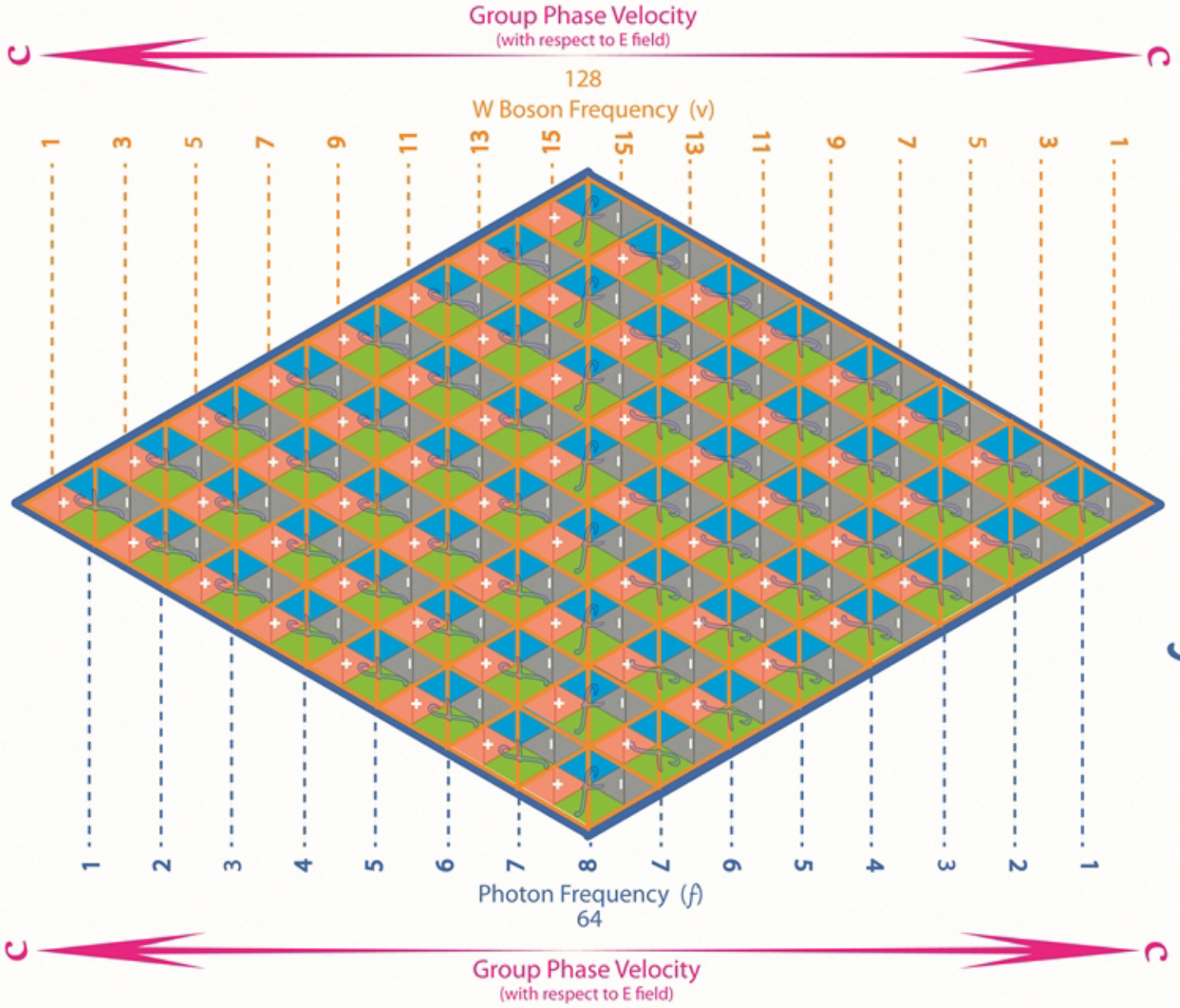
$E = hv$

$2v = f$

$E = hf$

Even numbers totaling to a Square number

EM waves are also comprised of longitudinal Photons



$2hv = E = hf$

[Bosons] ODD π

(1,3,5,7,9, ...)

Z BOSONS are 1/2 wavelength quantum levels

$E = h\nu$

vs.

1:1

PHOTONS are integer wavelength frequencies

$E = hf$

[Photons] EVEN π

(2,4,6,8,10, ...)

$$1\pi_{\text{Bosons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta

ElectroMagnetic · mass · velocity

ZPFs are Boson quantums

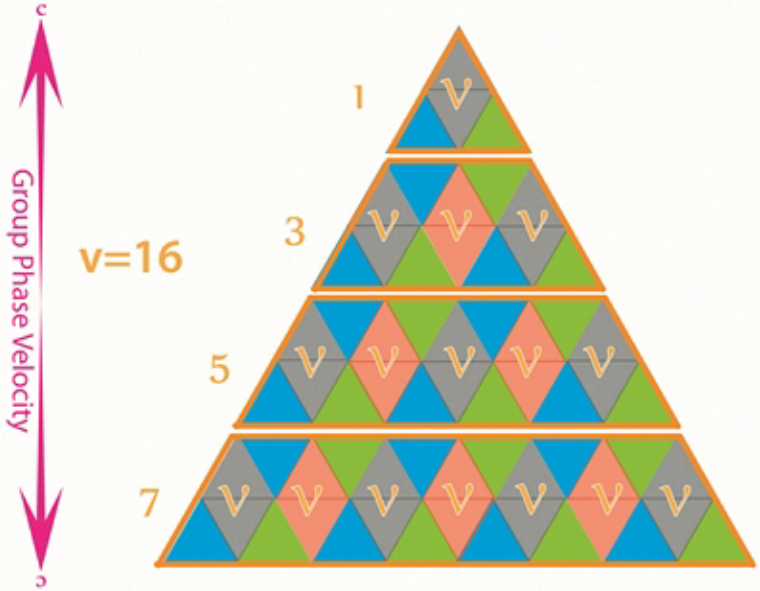
$$2\pi_{\text{Photons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta

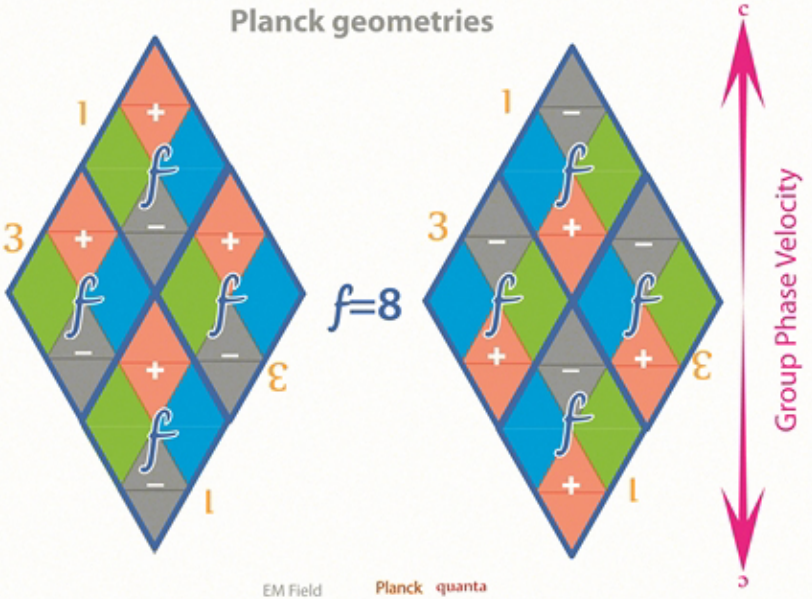
ElectroMagnetic · mass · velocity

Photons are comprised of Bosons

Bosons and Photons have differing EM geometries



Photons are EVEN number Planck geometries



$$\text{ODD}\pi_{\text{Bosons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta

ElectroMagnetic · mass · velocity

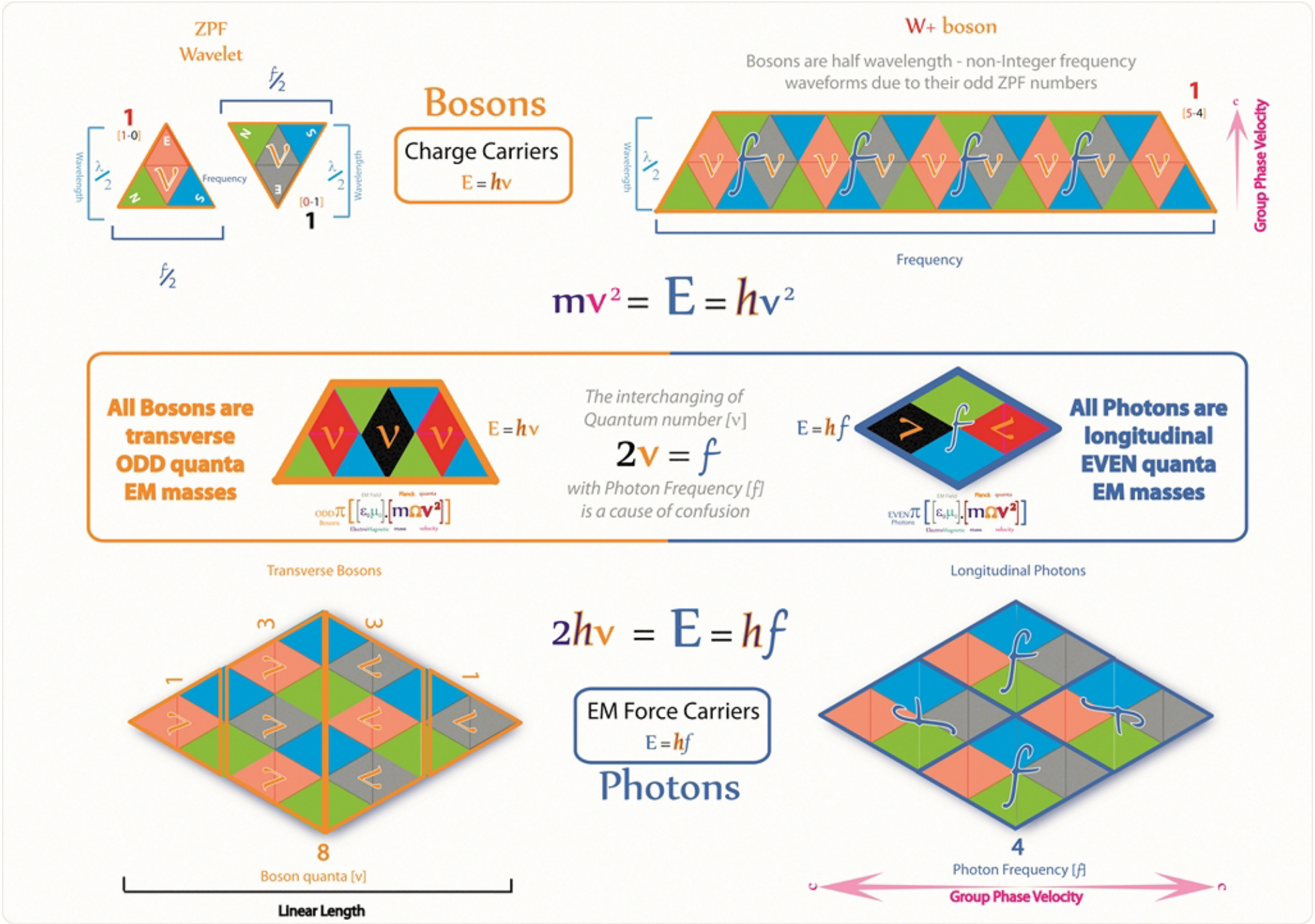
Charges are comprised of transverse Bosons

$$\text{EVEN}\pi_{\text{EM waves}}\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta

ElectroMagnetic · mass · velocity

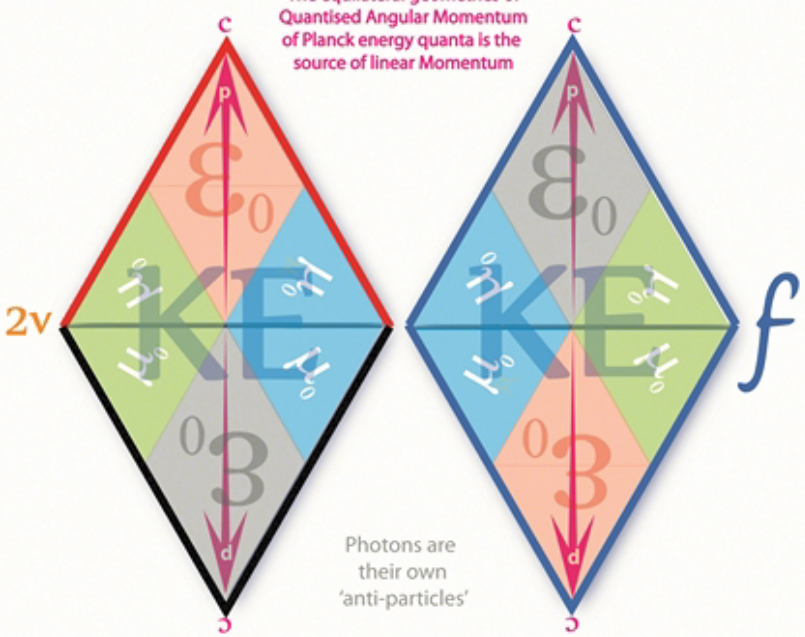
EM waves are comprised of longitudinal Photons



Photonic Energies

$$2p^2 = KE = 2mv^2$$

The equilateral geometries of Quantised Angular Momentum of Planck energy quanta is the source of linear Momentum



$$2h\nu = E = hf$$

$$E_\gamma = 2mc^2$$

As Photons are 2D EM energy waveforms they should always be referred to as having EM mass-energy equivalence

$$\gamma$$

$$2\pi\left[m\omega v^2\right]$$

mass velocity (Planck quanta)

$$2\pi_{\text{Photons}}\left[\left[\varepsilon_0\mu_0\right].\left[m\omega v^2\right]\right]$$

ElectroMagnetic (EM Field) mass velocity (Planck quanta)

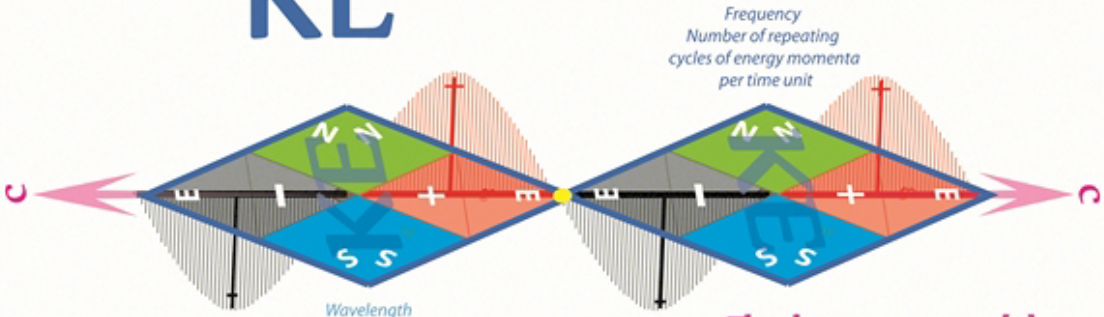
Photons are kinetic energy [KE] wave packets:

$KE = (1/2) * m_\gamma * v^2$

$= 1/2 * (E/c^2) * c^2$

$= E/2$

$$KE$$



They have momentum [p]:

$p = m_\gamma * v$

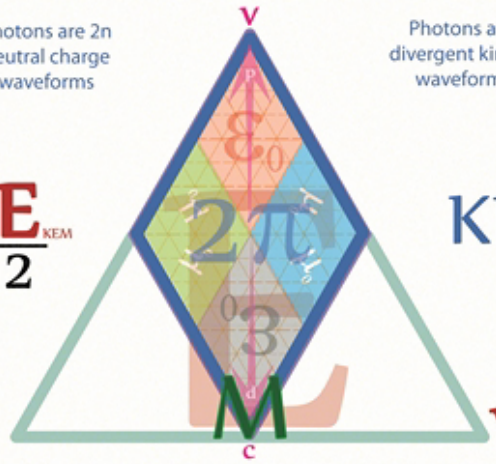
$=(E/c^2)*c$

$= E*c$

$$0_{[v-v]}$$

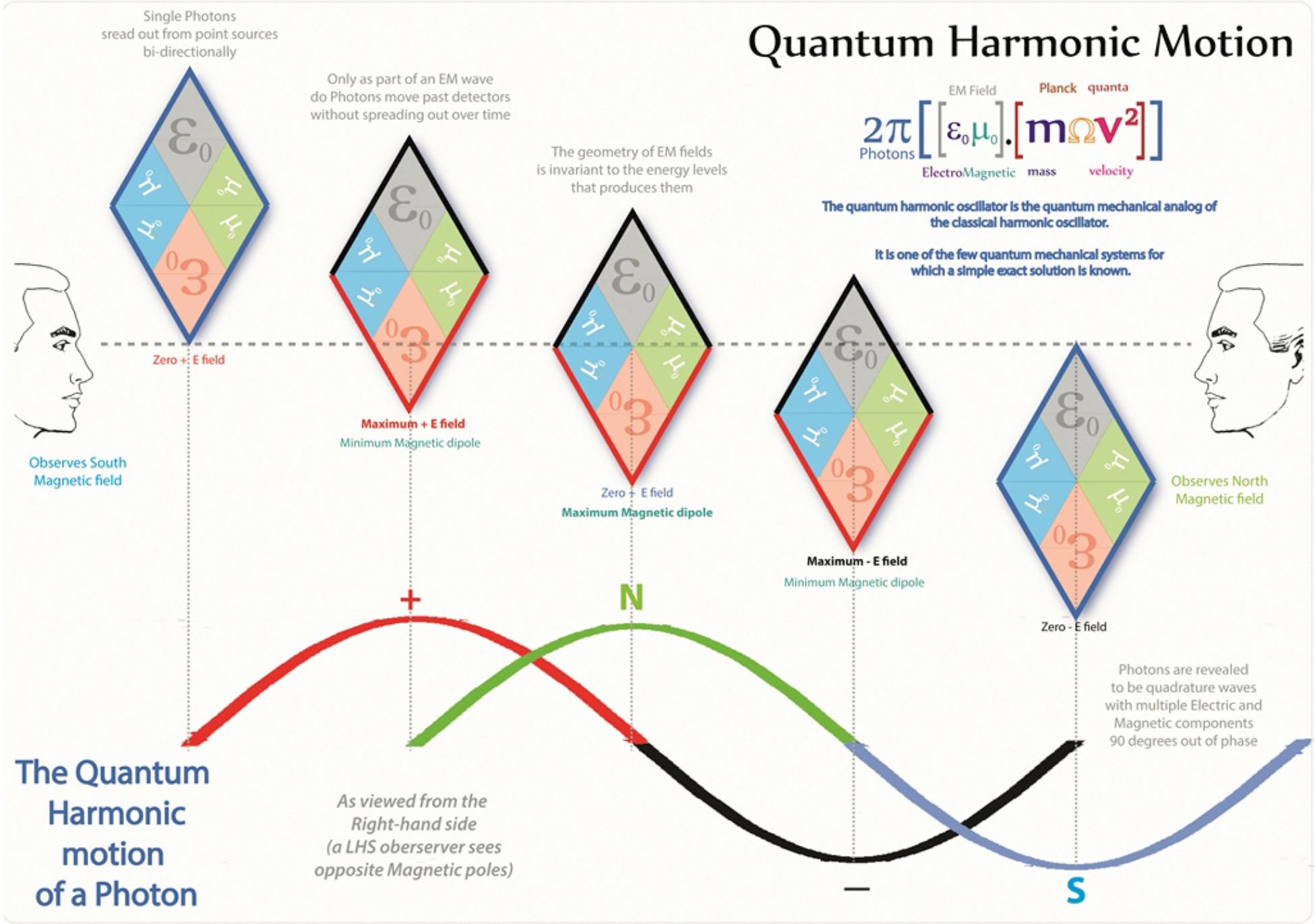
Photons are 2n neutral charge waveforms

Photons are divergent kinetic waveforms

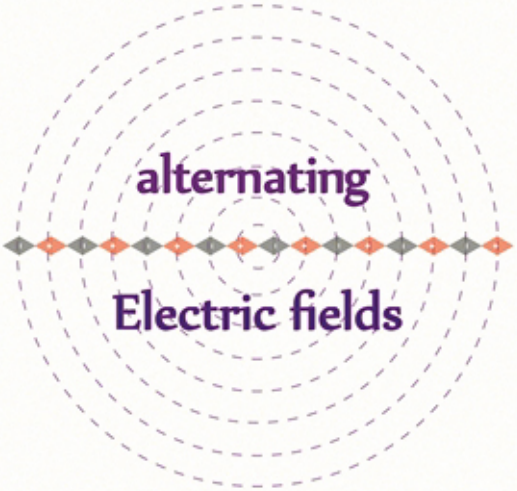


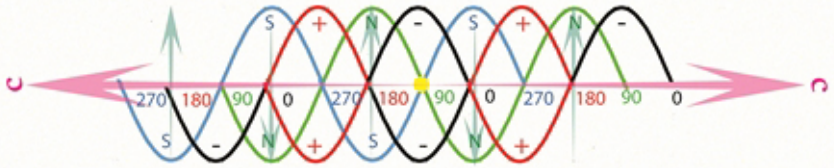
$$KE = \frac{E_{KEM}}{2}$$

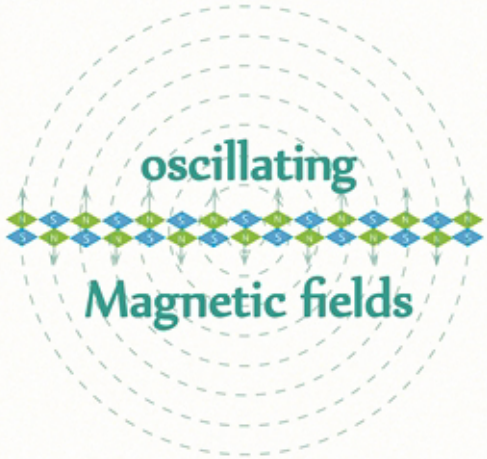
$$KE = \frac{1}{2}Mv^2$$



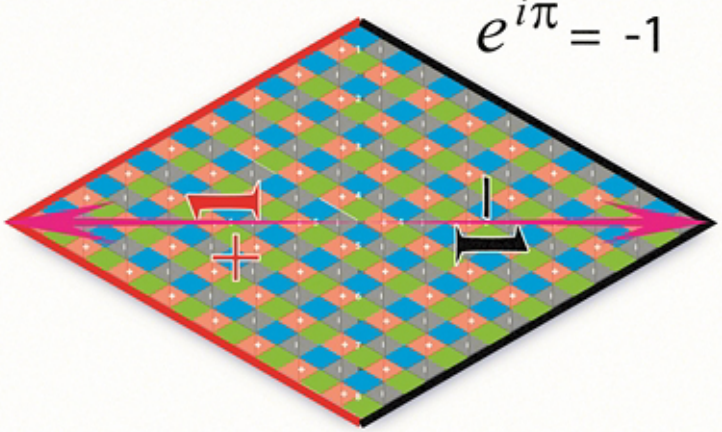
Photonic EM fields



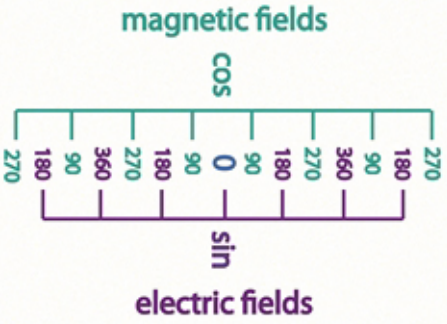


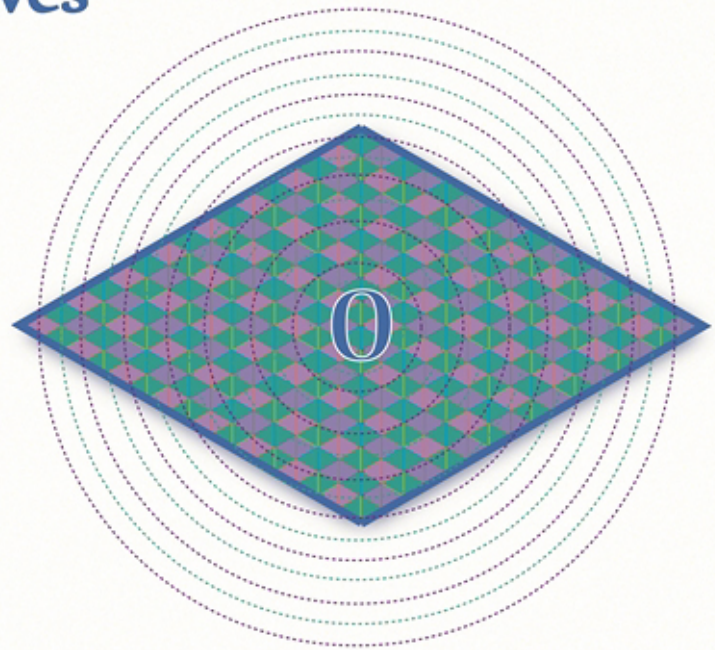


Euler's formula is a natural geometric expression of electromagnetic waves



$$e^{ix} = \cos x + i \sin x$$





Every field geometry in a EM wave is 90 degrees out of phase with the E or M field adjacent to it

$e^{i\pi} = -1$

$e^{i\pi} + 1 = 0$

Euler's Formula

Euler's formula is often considered to be the basis of the complex number system. In deriving this formula, Euler established a relationship between the trigonometric functions, sine and cosine, and e raised to a power

$$e^{ix} = \cos(x) + i\sin(x)$$

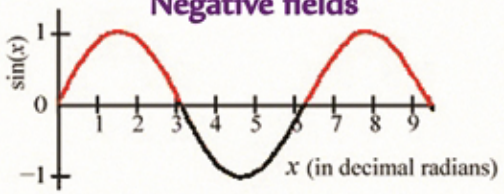
a mathematical description of EM-Energy waveforms

adjacent EM fields are 90-180° out of phase

Leonhard Euler

(15 April 1707 – 18 September 1783)

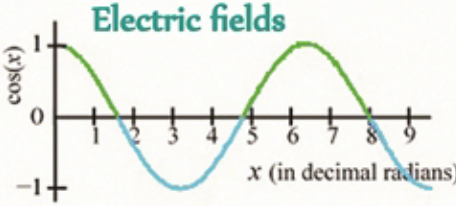
Positive E-fields are out of phase with Negative fields



$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots$$

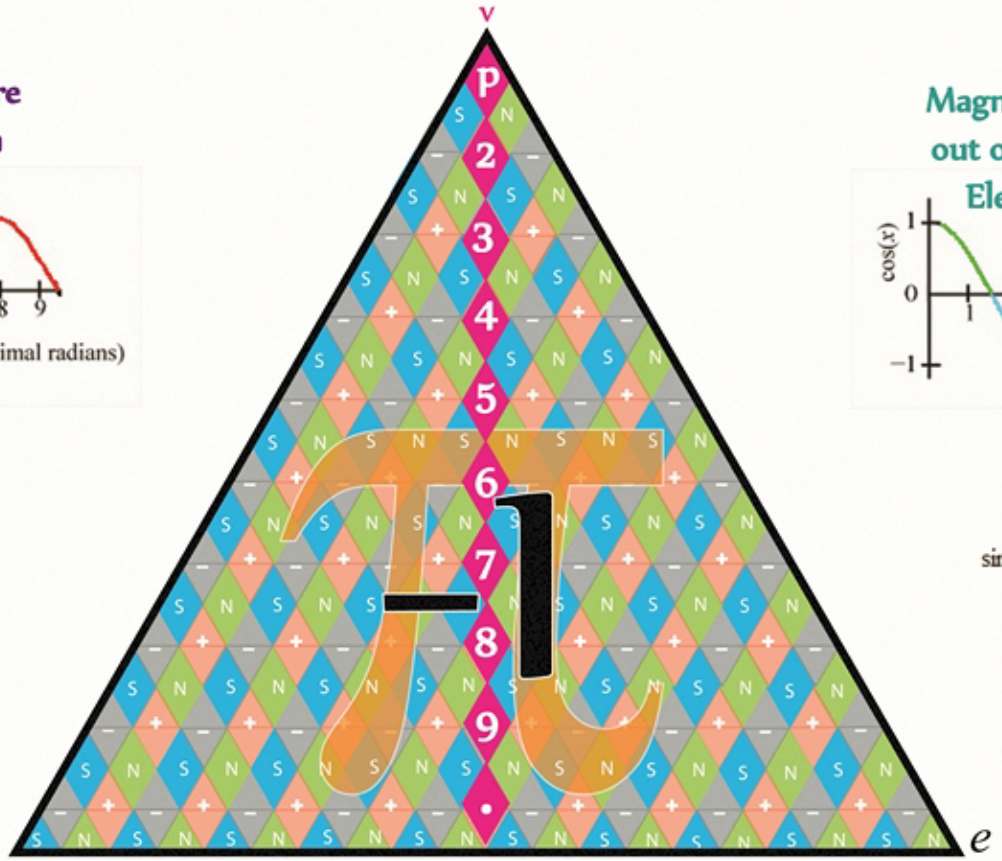
$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \dots$$

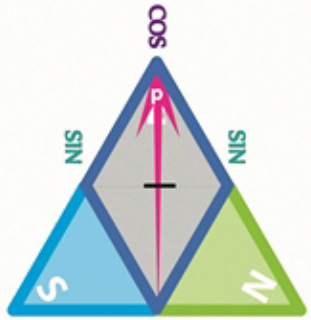
Magnetic fields are out of phase with Electric fields



$$\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \dots$$

$$\sin x + \cos x = 1 + x - \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \dots$$





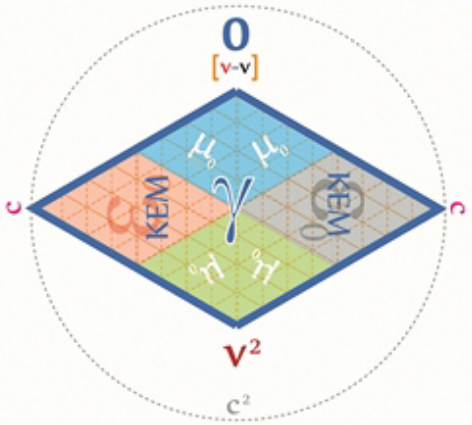
The above geometry is reflective of negative charge energy momenta Planck geometries

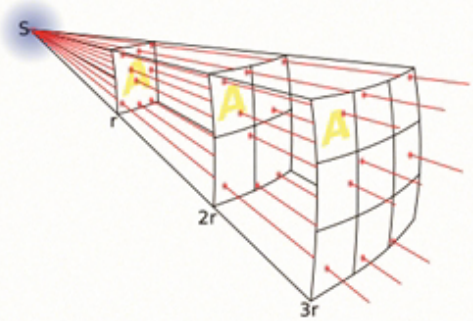
the momentum of the nett charged geometry is the Square root of Negative 1

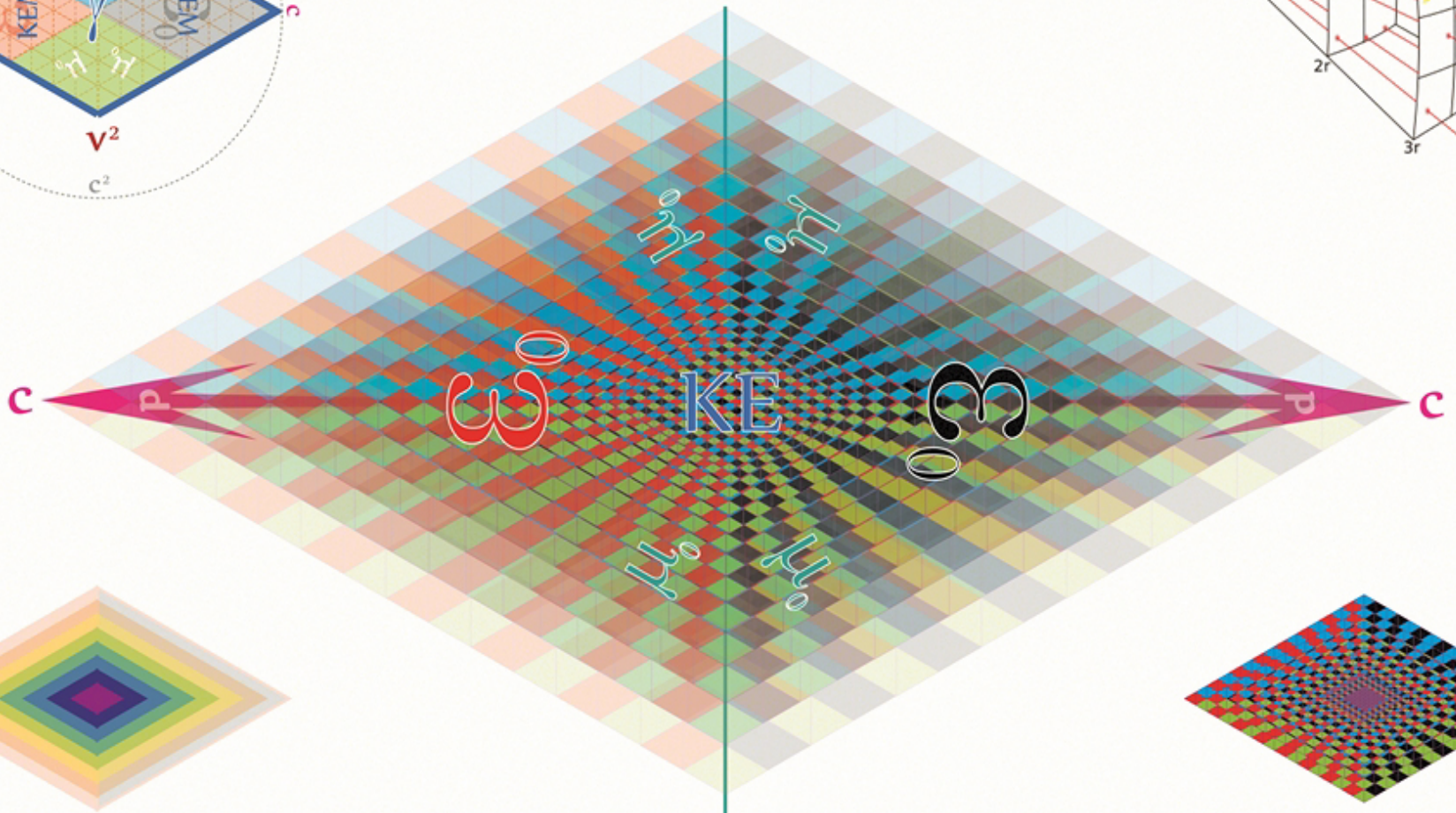
Inverse Square Law

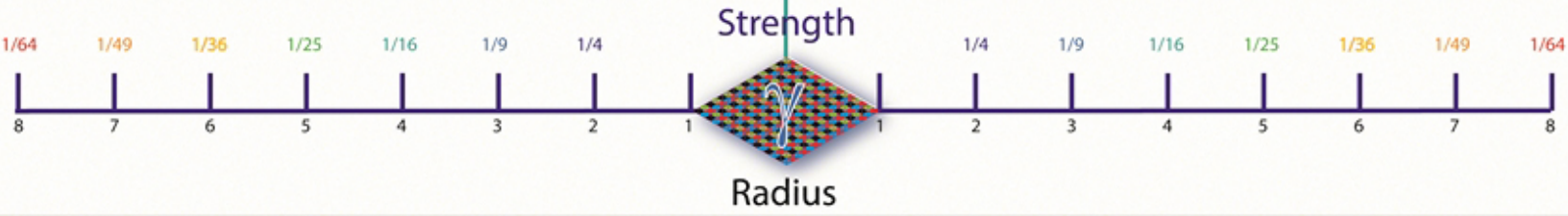
Squared numbers are equilateral geometries

Any point source which spreads its influence equally in all directions
without a limit to its range will obey the inverse square law







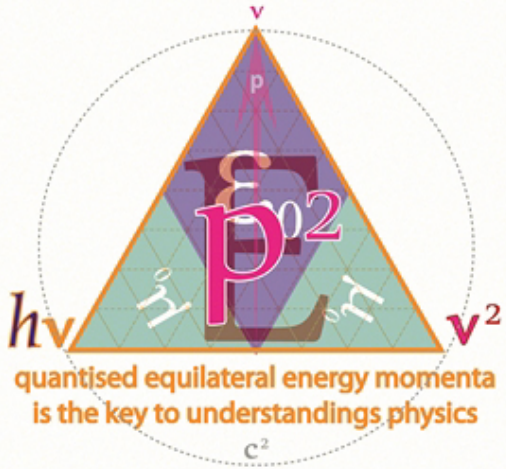


mass-Energy momenta

$$n\pi \left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

n: mass; $\varepsilon_0\mu_0$: ElectroMagnetic; m: mass; Ω: Planck quanta; v^2: velocity

Throughout history Physicists have sought relationships between EM mass-Energy and momenta in an attempt to discern the true Nature of these physical properties



E
Energy

$$kg\,\frac{m^2}{s^2}$$

$E = m\nu$ — *Newton*

$E = m\nu^2$ — *Leibnitz*

$\nu = \frac{1}{\sqrt{\varepsilon_0\mu_0}}$ — *Maxwell*

Velocity of Light

$$\nu = \left[\left[\frac{c^2}{\Omega}\right].\left[\frac{\Omega}{c}\right]\right]$$

f: Scalar Frequency; λ: Linear Wavelength

Planck $E = h\nu$

Einstein $E = hf$

de Broglie h/p

Compton Frequency

$$\left[\frac{E}{h}\right]$$

Planck's Constant

$$kg\,\frac{m^2}{s}$$

de Broglie wavelength

$$\left[\frac{E}{p}\right]$$

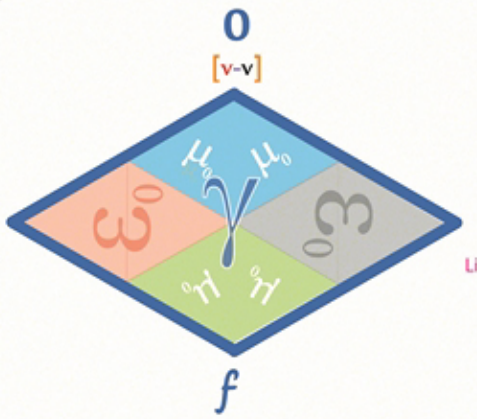
Wavelength

p
Linear momentum

$$kg\,\frac{m}{s}$$

Ryberg wavenumber

$$\left[\frac{p}{E}\right]$$

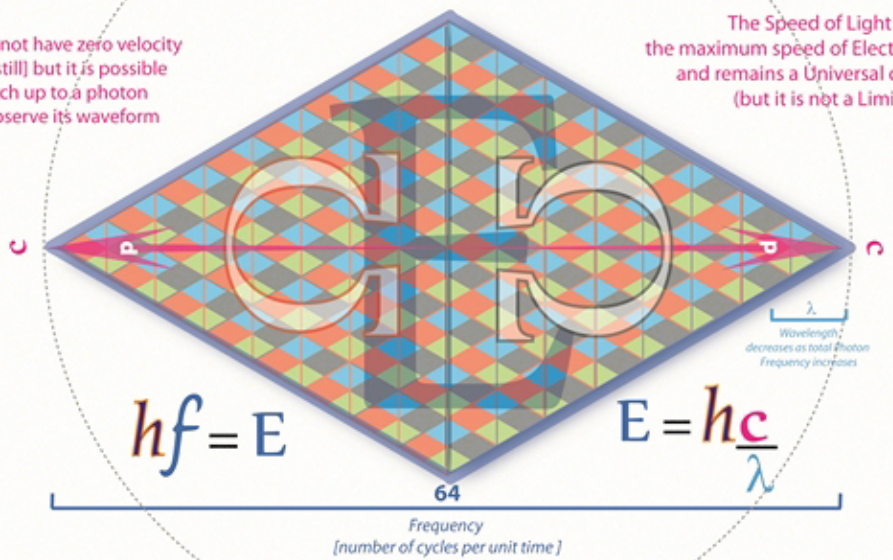


$$mv^2 = KE = hv^2$$

All Photons contain Energy momenta
and therefore have electromagnetic mass
but they are 'Matterless' geometries

Light cannot have zero velocity
[stand still] but it is possible
to catch up to a photon
and observe its waveform

The Speed of Light is
the maximum speed of Electrical energy
and remains a Universal constant
(but it is not a Limit)



$hf = E$

$E = h\frac{c}{\lambda}$

c^2

Celeritas

[Frequency x Wavelength]

EM waves are typically described
through any of their following
three physical properties:

frequency *f*,
wavelength λ, or
photon energy E

Frequency, momentum, and Wavelength
are all related through the geometries of c & c²

Velocity of Light

$$c = \left[\left[\frac{c^2}{\Omega}\right]\cdot\left[\frac{\Omega}{c}\right]\right]$$

$$v = \frac{1}{\sqrt{\varepsilon_0\mu_0}}$$

Frequency (f) Wavelength (λ)

Wavenumber

$$\frac{m}{s}\cdot\frac{s}{m^2}\left[\frac{c}{\Omega}\right]\frac{1}{m}$$

ElectroMagnetic Fields

$$\varepsilon_0\mu_0 = \frac{1}{c^2}$$

$1.112650056\text{ e-}17\ \frac{s^2}{m^2}$

$$\lambda$$

$$m\left[\frac{\Omega}{c}\right]\frac{m^2}{s}\cdot\frac{s}{m}$$

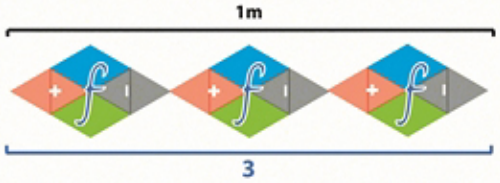
Wavelength

$$f$$

$$\frac{m^2}{s^2}\cdot\frac{s}{m^2}\left[\frac{c^2}{\Omega}\right]\frac{1}{s}$$

Frequency

Frequency is the number of neutral quanta sets repeating per unit time in a EM wave



EM waves frequencies [photon number] change in direct proportion to the energy content of any electromagnetic wave

The specific wavelengths and frequencies of energy momenta in KEM fields form the basis for Spectral emission/absorption lines [care must be always taken to specify if quanta or photons are being measured]

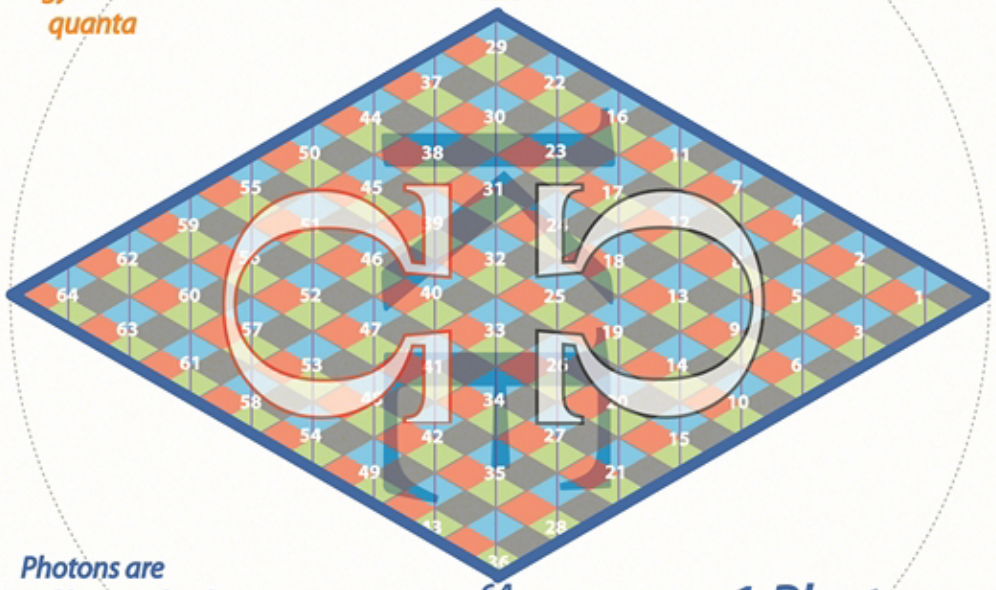
$2v = f$

$E = hv$

Bosons are charged transverse energy momenta quanta

2 charge quanta

128



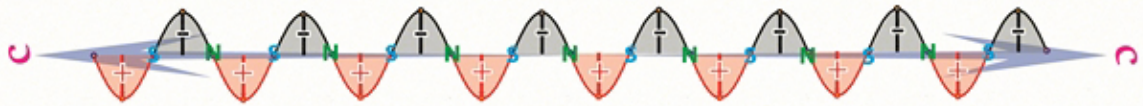
64

Photons are neutral longitudinal energy momenta waveforms

1 Photon

$E = hf$

c^2



Frequency
[Number of Neutral ZPF sets per unit of time]

Irrespective of whether its measured as a transverse or longitudinal electromagnetic wave

Frequency is the inverse of Charge

$$f \left[\frac{c^2}{\Omega}\right]$$

Frequency

is directly related to the nett quantised angular momentum of any space time geometry

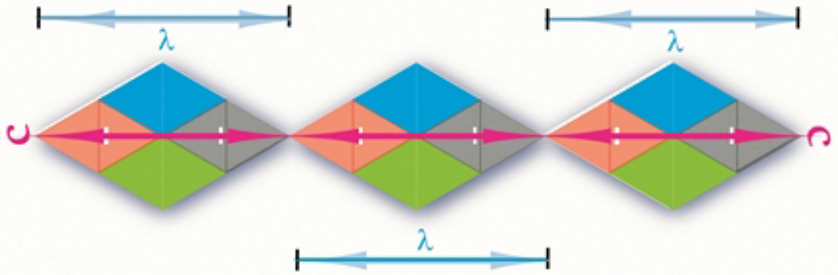
Wavelength

Wavelength is a measure of the distance between repetitions of geometric features such as maximums, minimums, or zero-points of Electric and Magnetic fields

$$\lambda$$

$$\left[\frac{\Omega}{c}\right]$$

Wavelength



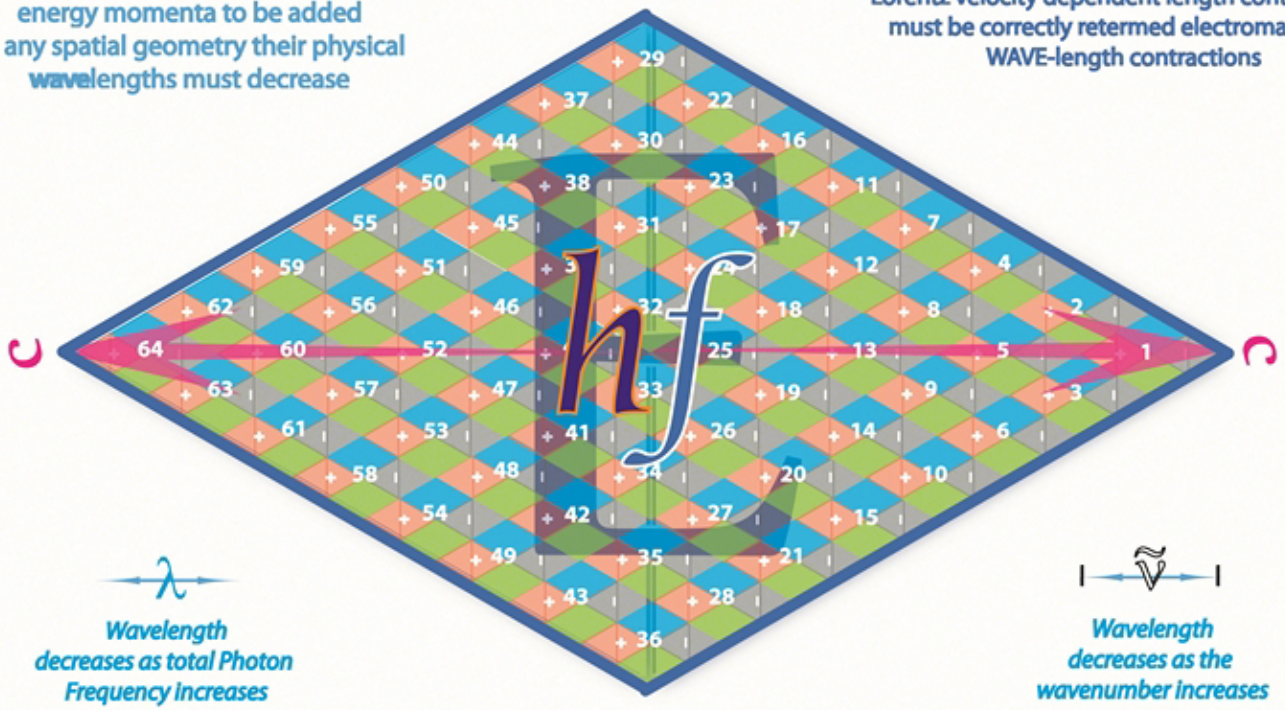
$$\tilde{\nu}$$

Wavelengths are the inverse of Wavenumbers

$$\lambda$$

For additional quantised energy momenta to be added to any spatial geometry their physical **wave**lengths must decrease

Lorentz velocity dependent length contractions must be correctly retermed electromagnetic WAVE-length contractions

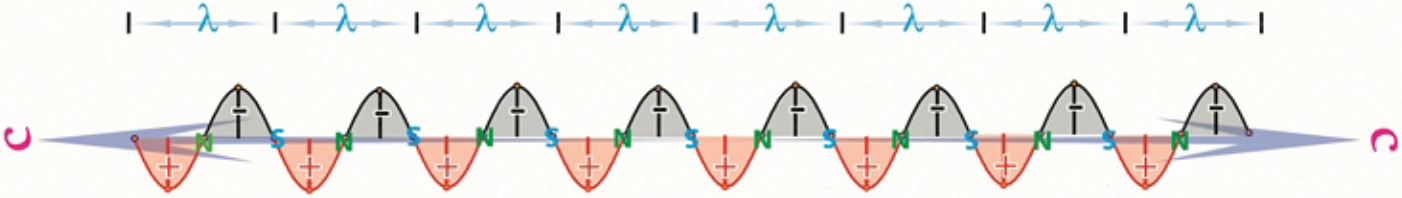


Wavelength decreases as total Photon Frequency increases

Wavelength decreases as the wavenumber increases

In physics, the wavelength of a sinusoidal wave is the spatial period of the wave – the distance over which the wave's shape repeats. It is usually determined by considering the distance between consecutive corresponding points of the same phase, such as crests, troughs, or zero crossings, and is a characteristic of both traveling waves and standing waves, as well as other spatial wave patterns.

The concept can also be applied to periodic complex or non-sinusoidal waves



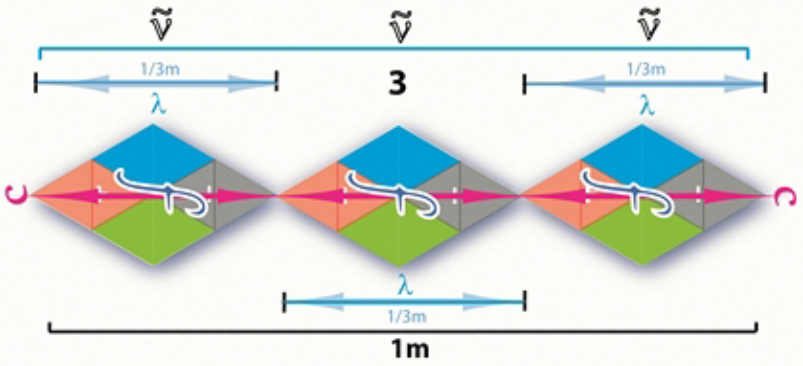
299,792,458
linear metres per second

Wavenumbers

$\tilde{\nu}$

Wavenumbers are the inverse of Wavelengths

λ



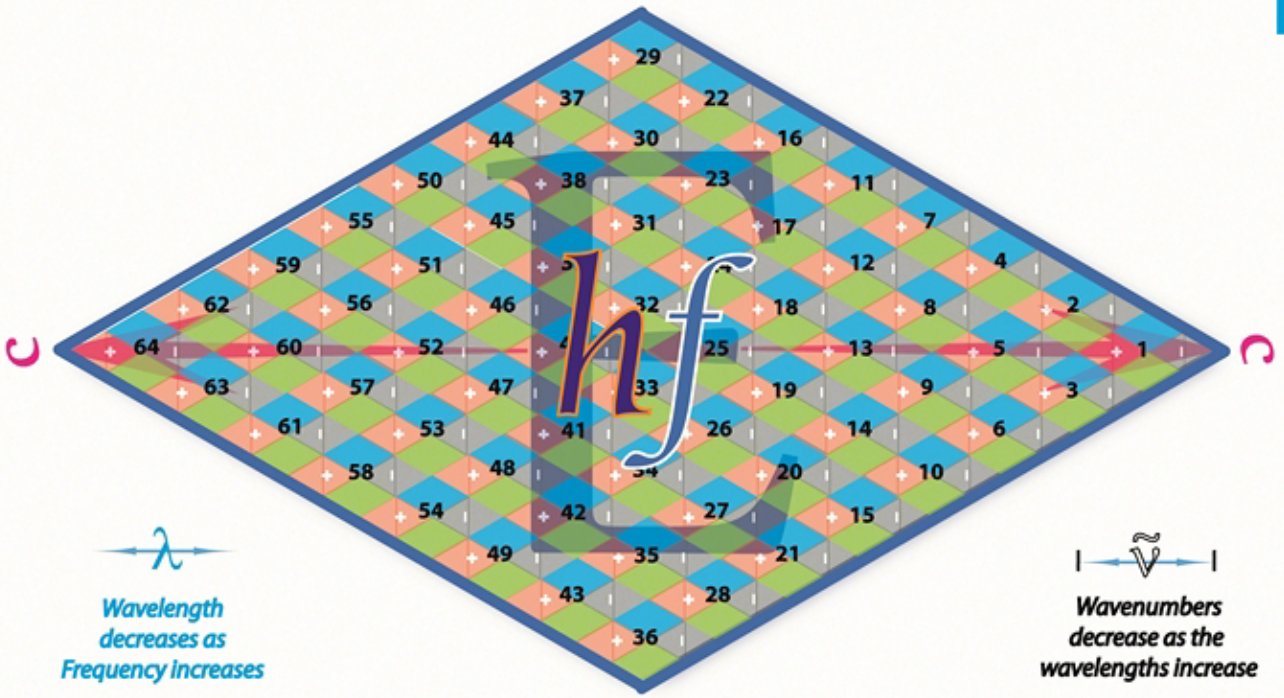
Wavenumbers are the spatial equivalent of Frequency

$$\left[\frac{c}{\Omega}\right]$$

$$\lambda$$

$$\left[\frac{\Omega}{c}\right]$$

Wavelength and Frequency are related to the group velocity of quanta in an EM wave

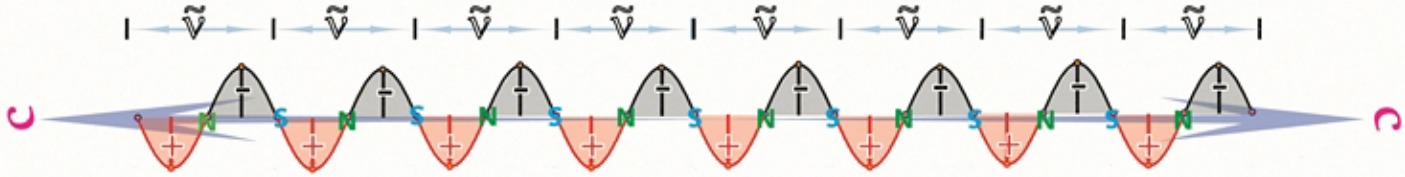


$$\tilde{\nu} = 1/\lambda$$

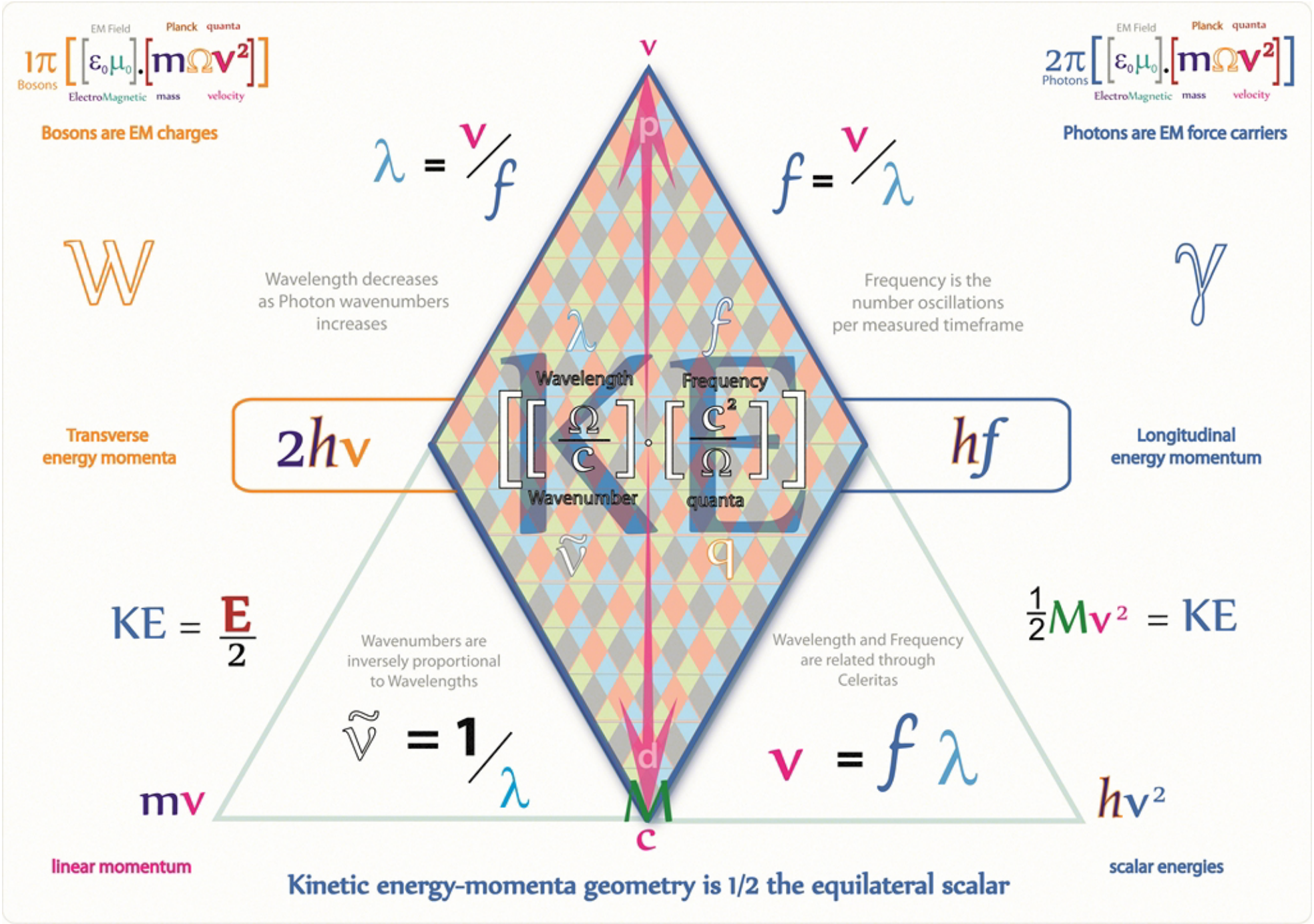
Wavenumbers are inversely proportional to Wavelengths

Wavelength decreases as Frequency increases

Wavenumbers decrease as the wavelengths increase

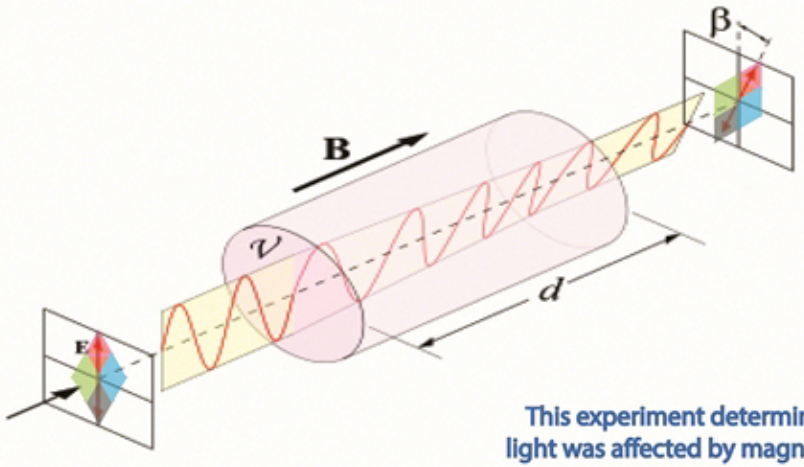


299,792,458
linear metres per second



Faraday Rotation

The Faraday effect or Faraday rotation is a Magneto-optical phenomenon, that is, an interaction between light and a magnetic field in a medium. The Faraday effect causes a rotation of the plane of polarization which is linearly proportional to the component of the magnetic field in the direction of propagation.



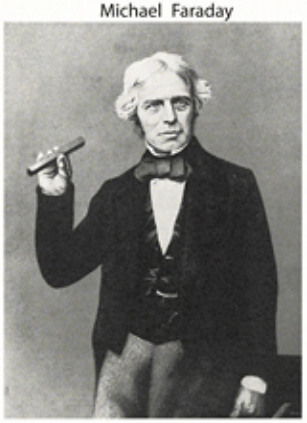
Discovered by Michael Faraday in 1845, the Faraday effect was the first experimental evidence that light and electromagnetism are related

Faraday summarized the entire effect as follows:

"Magnetic lines, then, in passing through silicated borate of lead, and a great number of other substances, cause these bodies to act upon a polarized ray of light when the lines are parallel to the ray, or in proportion as they are parallel to it: if they are perpendicular to the ray, they have no action upon it.

They give the diamagnetic the power of rotating the ray; and the law of this action on light is, that if a magnetic line of force be going from a north pole, or coming from a south pole, along the path of a polarized ray coming to the observer, it will rotate that ray to the right-hand; or, that if such a line of force be coming from a north pole, or going from a south pole, it will rotate such a ray to the left hand."

Michael Faraday

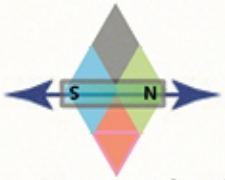


(22 September 1791 – 25 August 1867)

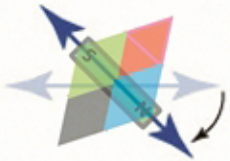
This experiment determined that light was affected by magnetic force. This "magneto-optical effect" was later termed the Faraday effect.

Faraday experimented with other substances that yielded similar results.

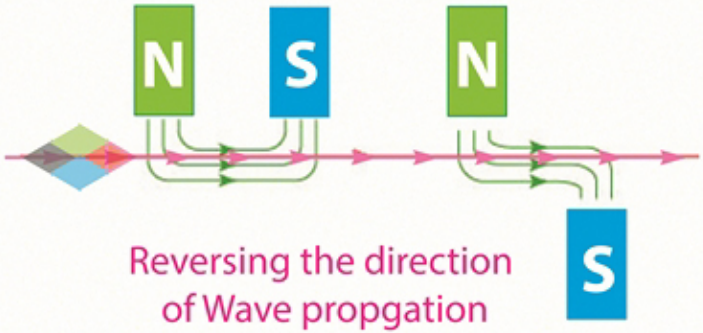
The resultant effect he termed "diamagnetism" concluding that magnetism was an inherent property of all EM mass-ENERGY-Matter



Before the Magnetic field



After the Magnetic field



Reversing the direction of Wave propgation reverses the rotation effected by the external magnetic field

Evan's Photomagneton

A photon has a magnetic dipole. It is an elementary magnet. Evans discovery of the photon's longitudinal magnetic field in 1992 is as significant, as Einstein's discovery of relativity.

It helps in giving a physical interpretation of wave mechanics, two-slit interference and the Faraday effect,

all accounted for in Tetryonic Theory.

Every Photon and EM wave has polarised magnetic apexes as a result of the Planck quanta constituing them (creating Magnetic moments)

These Photo-Magnetic Moments allow for the interaction of Photons with external magnetic fields resulting in Faraday rotation of Photons and EM fields

Isaac Newton allowed sunlight from a small, circular hole to fall on a prism, producing a rainbow of color. Although the production of a rainbow by a clear crystal was known to the ancients, it was Newton who showed that the colors did not originate in the crystal, but rather were components of sunlight.

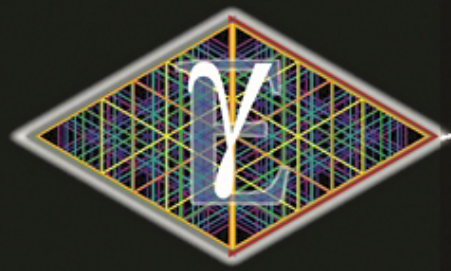
Spectral colours

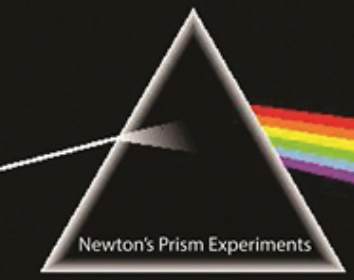
William Herschel:
The Discovery of Infrared Light

White Light is comprised of many coloured corpusles

Refracting Prism

White Light





This array of colors he called a spectrum.

Red
Orange
Yellow
Green
Aqua
Blue
Indigo
Violet

Johann Ritter:
The Discovery of Ultraviolet Light

White Light is the result of superpositioned EM waves of differing wavelength Photons

Thomas Young discovered interference patterns caused by light passing through a narrow slit. Up until this point, the wave theory of light (Huygens) had had nothing convincing to offer in opposition to the particle theory of light (Newton). Now it did, because you cannot explain interference using particles.

The term "light" is often extended to wavelength ranges that the eye cannot detect - to infrared radiation, which has a frequency less than that of visible light, and to ultraviolet radiation, which have a frequency greater than that of visible light.

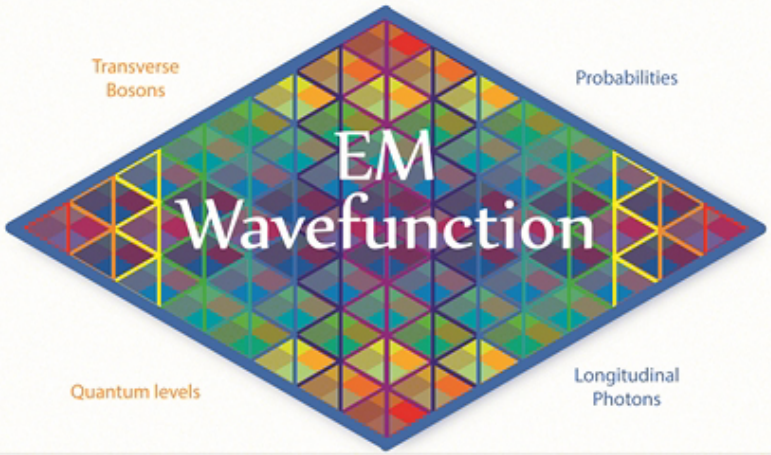
Light has:

Velocity
Angular momenta
Frequency
Wavelength
Relativistic Energy
Linear momentum
Kinetic Energies
Magnetic Moment

and can

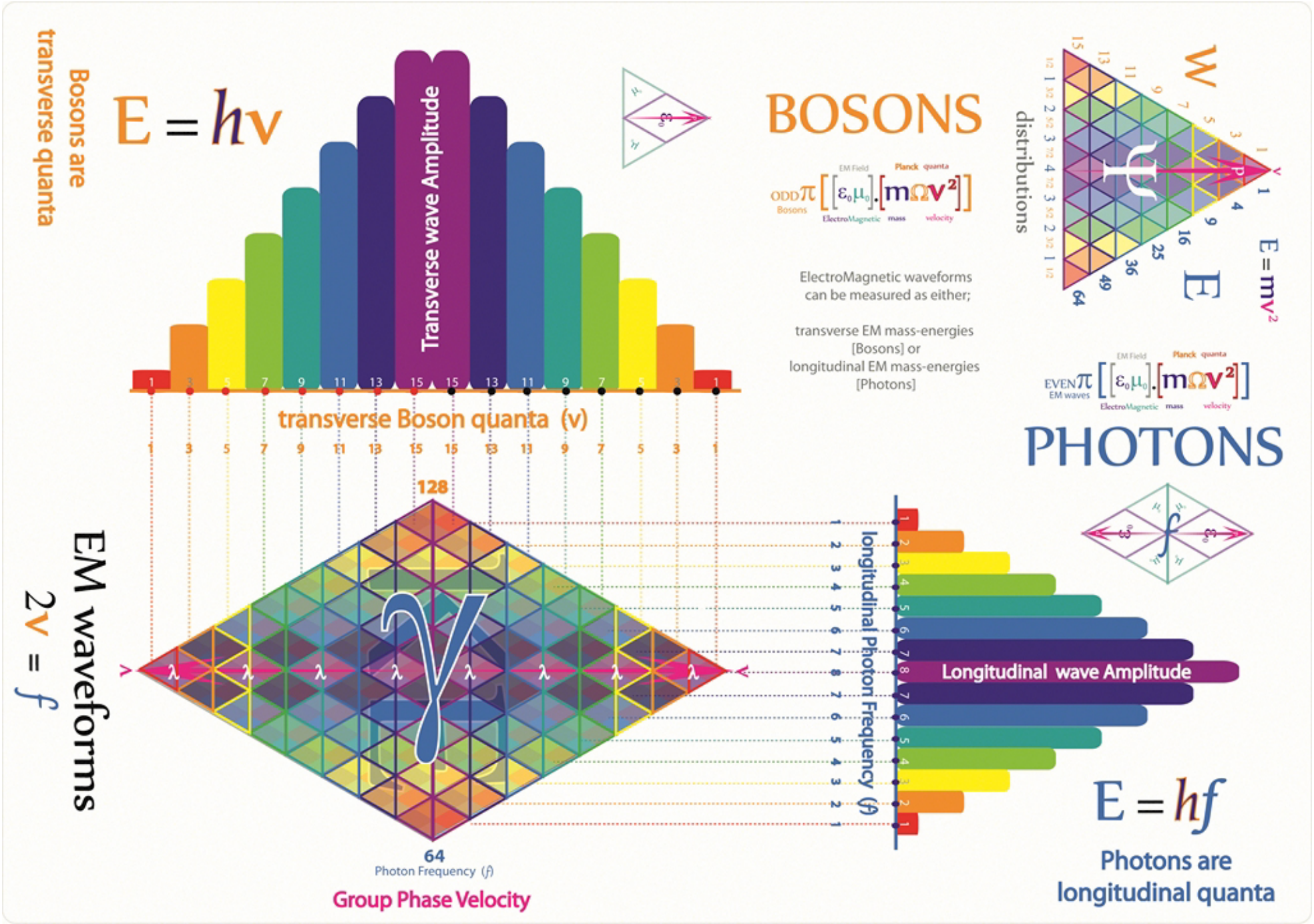
Refract
Reflect
Defract
and
Disperse

γ



ψ

All EM waves possess Wavefunctions describing their probabilistic energy properties



Wavefunction probabilites

Wave Amplitude

Amplitude = bi-directional Momentum

Probability = [Amplitude]²

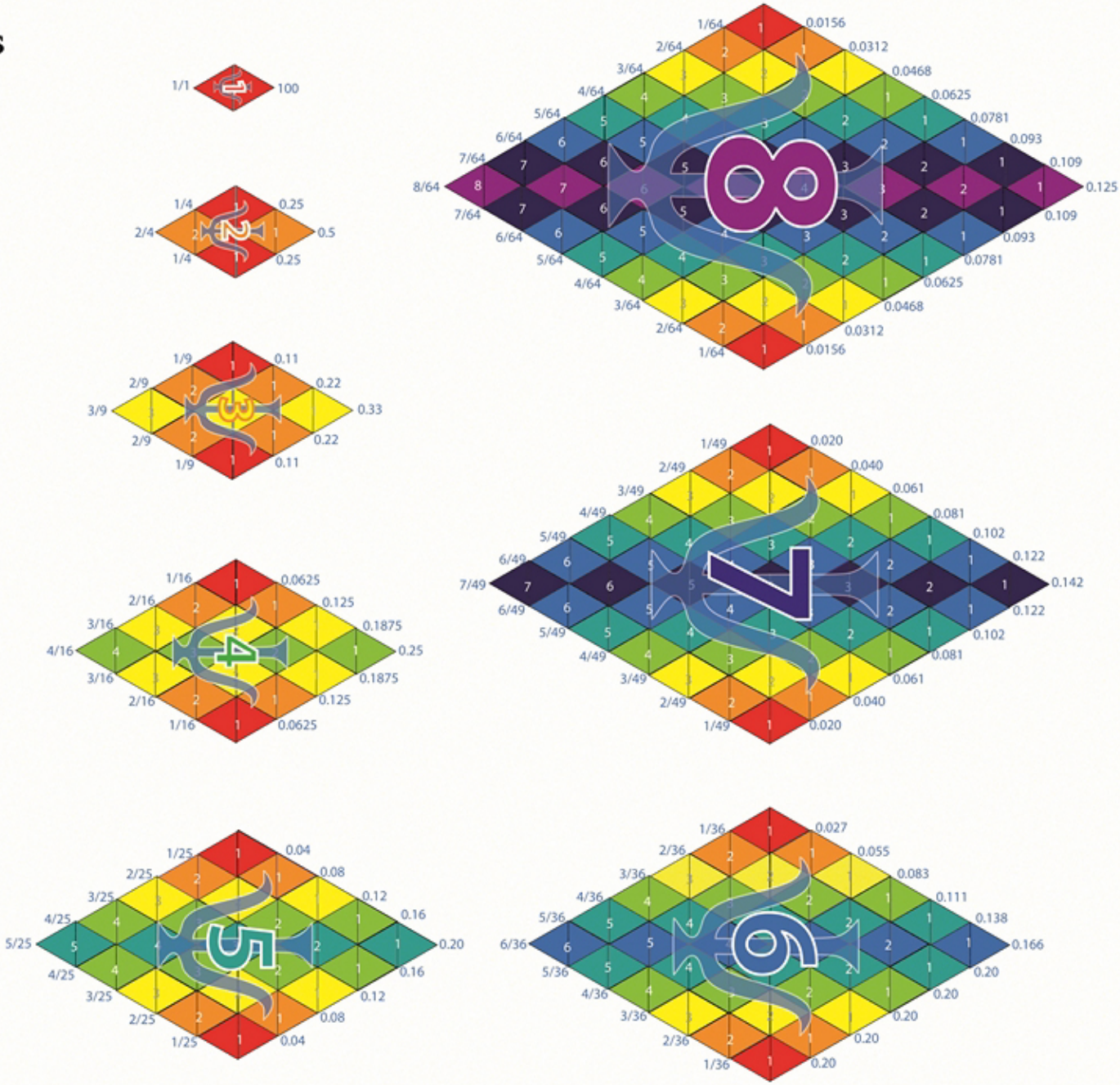
In his 1926 paper, Max Born suggested that the wave function of Schrödinger's wave equation represents the probability density of finding a particle

Probability of finding a Photon in a electromagnetic wave is the Square of its Amplitude

The de Broglie-Schrodinger wave fields should not to be interpreted as a mathematical description of how an event actually takes place in time and space, though, of course, they have reference to such an event.

Rather they are a mathematical description of what we can actually know about the system. They serve only to make statistical statements and predictions of the results of all measurements which we can carry out upon the system.

(Albert Einstein, on Quantum Physics, 1940)



EM radiation patterns

Quantum wavefunctions mathematically model the statistical probability distributions of electromagnetic mass-energy within EM waves

n1

1

n2

4

n3

9

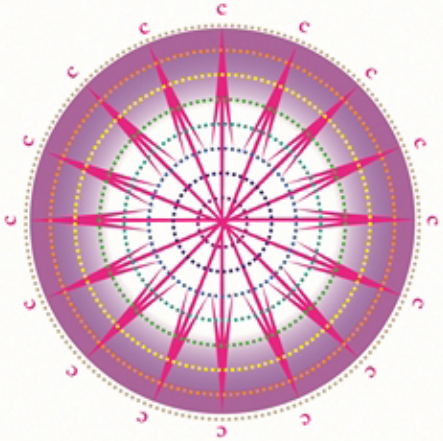
n4

16

As the energy of an EM wave increases so does its frequency

$E = mv^2$

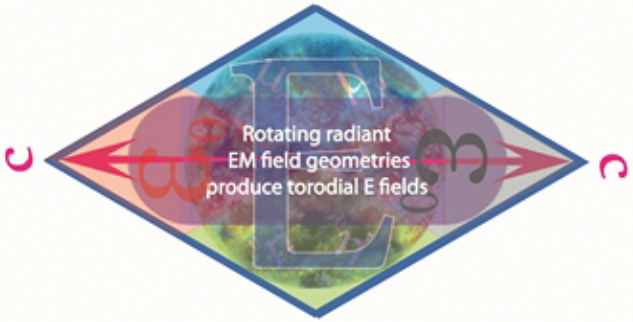
Polar Plot



Electric Field strength
$1/r^2$

EM waves radiate outward at the speed of light along their E fields within scribed radial time dependent spatial co-ordinates

$E = h\nu$



$E = hf$

n5

25

n8

64

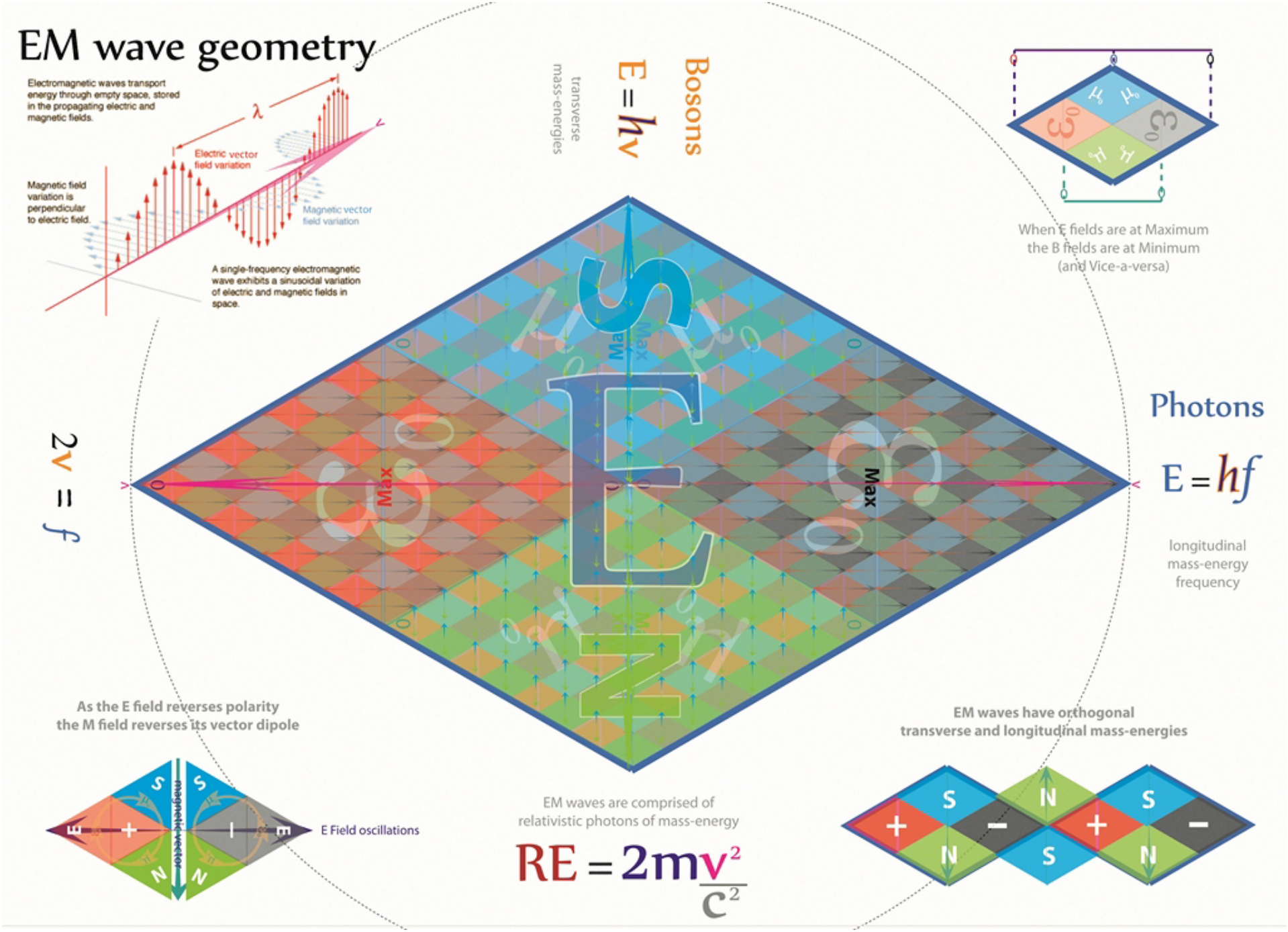
n7

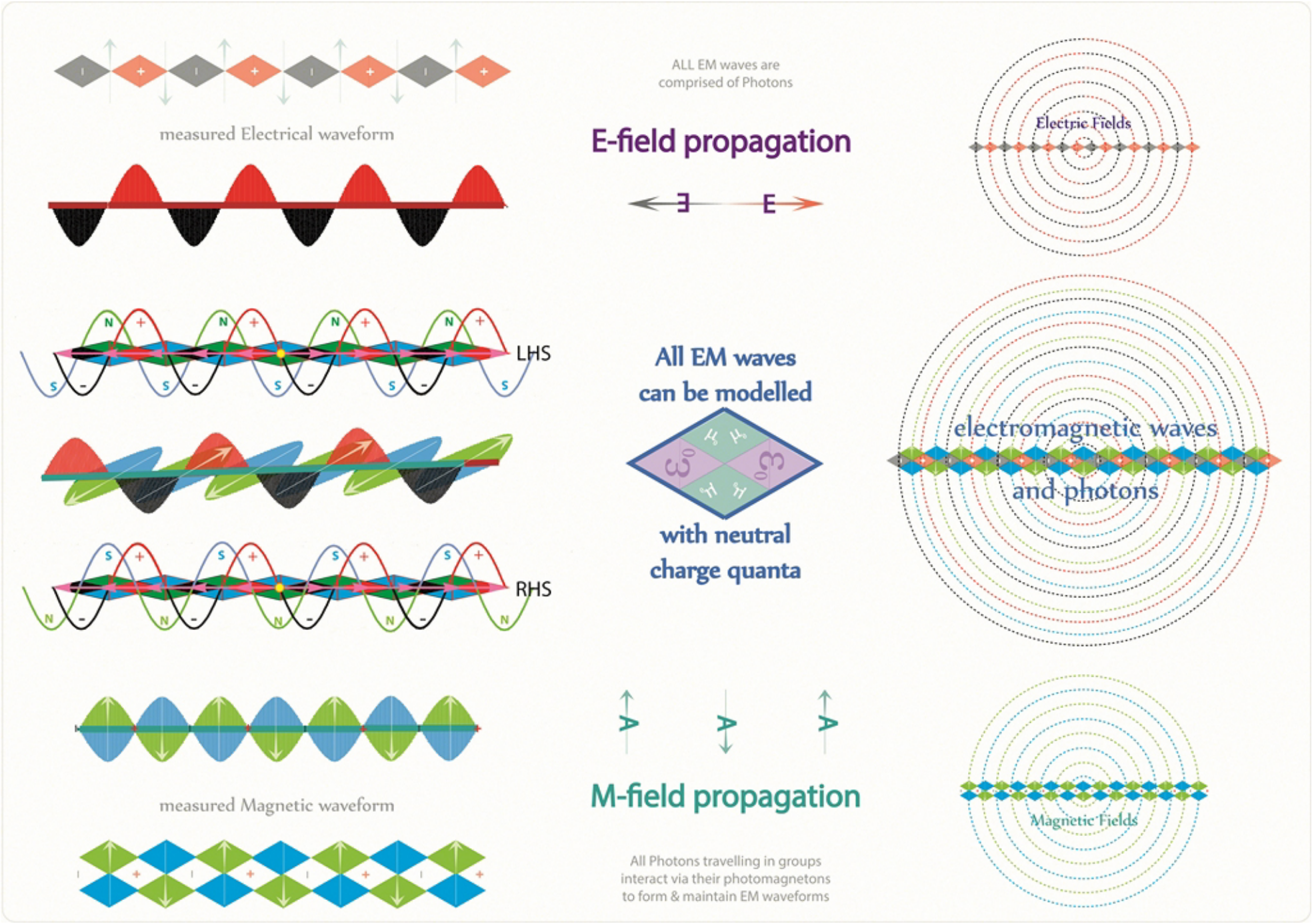
49

n6

36

As the Energy and frequency increase, the Wavelengths of the Photons in a EM wave decreases

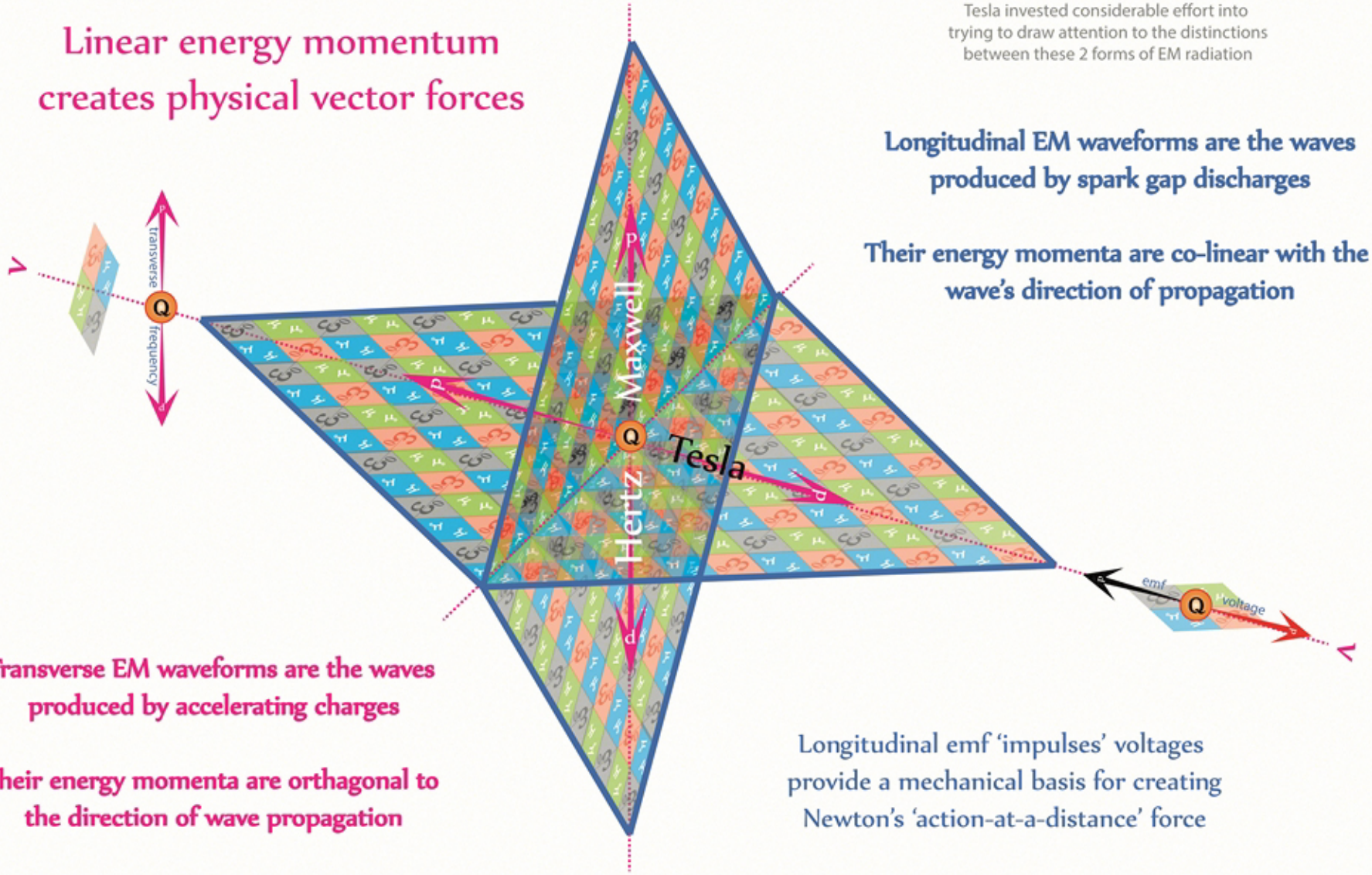




Energy momenta in EM waveforms

Linear energy momentum creates physical vector forces

Tesla invested considerable effort into trying to draw attention to the distinctions between these 2 forms of EM radiation



Longitudinal EM waveforms are the waves produced by spark gap discharges

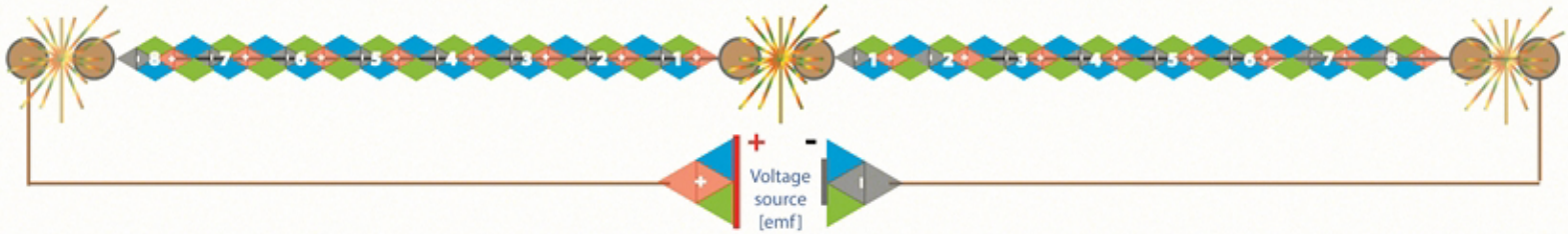
Their energy momenta are co-linear with the wave's direction of propagation

Transverse EM waveforms are the waves produced by accelerating charges

Their energy momenta are orthagonal to the direction of wave propagation

Longitudinal emf 'impulses' voltages provide a mechanical basis for creating Newton's 'action-at-a-distance' force

Producing Longitudinal EM waves

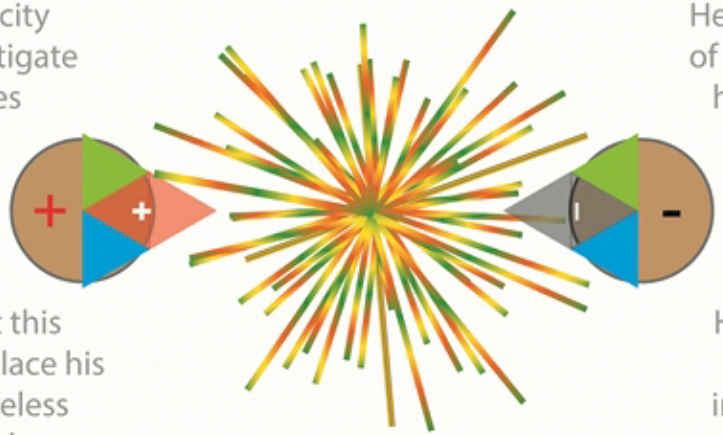


The short circuiting of voltage potentials or spark gap discharges of electrical energy are two ways to produce longitudinal EM waves

After inventing AC electricity Nikola Tesla began to investigate disruptive DC discharges

He noted the deadly power of the spark discharges and how they 'stung his face'

Orthagonal Magnetic fields produce reactive inductance fields



Longitudinal Electric fields produce lines of force

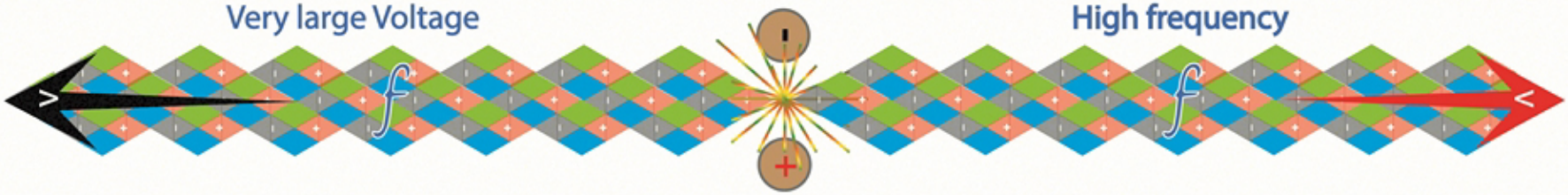
and he was convinced that this form of EM energy would replace his AC system and provide wireless energy to the World without losses

He strove to point out that the load circuits must be inductively coupled to the transmission circuits

or a combination of the two

Very large Voltage

High frequency



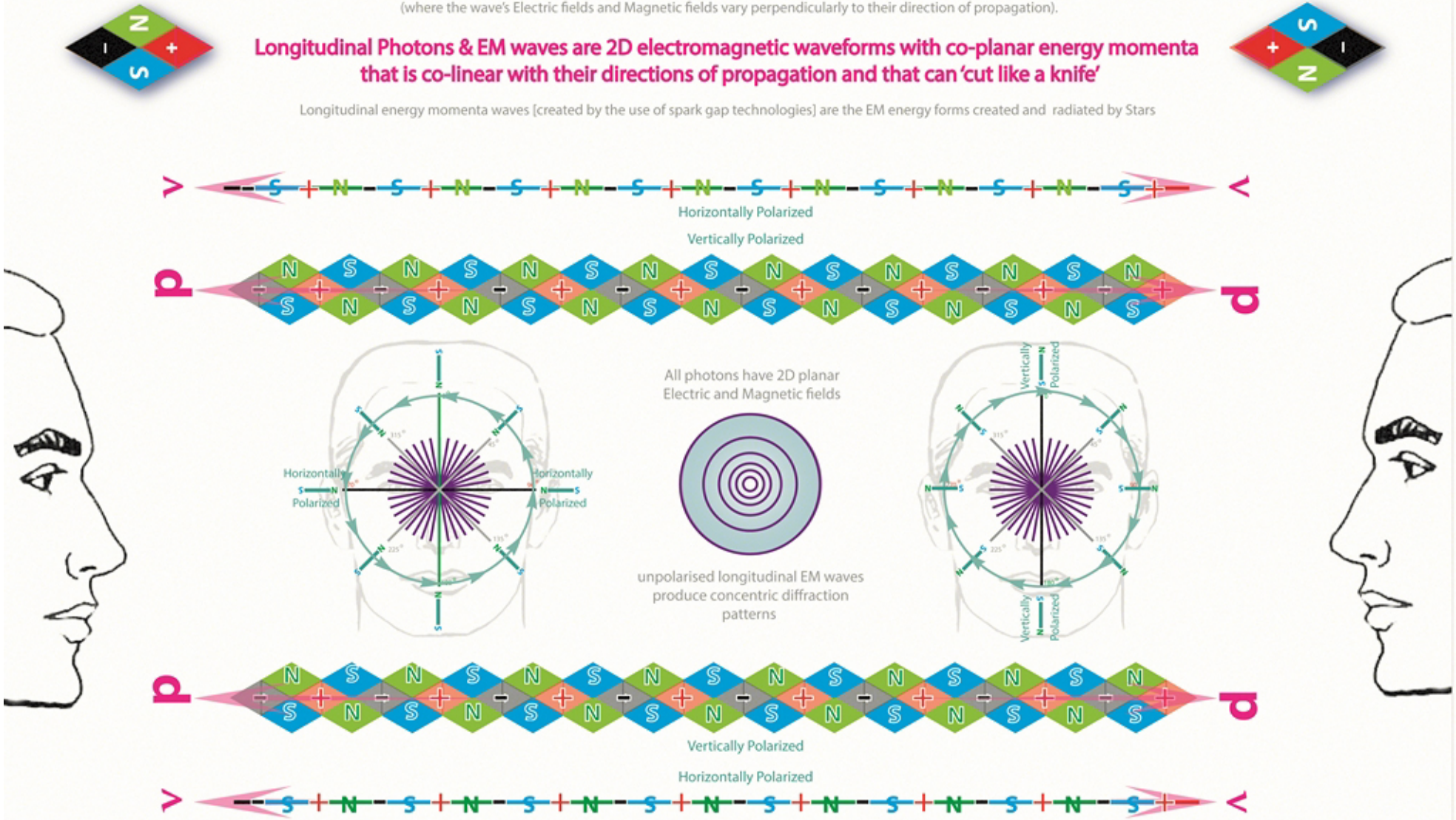
disruptive discharges

Longitudinal energy momenta

Maxwell's equations lead to the prediction of transverse electromagnetic waves as a means of transefering electrical power (where the wave's Electric fields and Magnetic fields vary perpendicularly to their direction of propagation).

Longitudinal Photons & EM waves are 2D electromagnetic waveforms with co-planar energy momenta that is co-linear with their directions of propagation and that can 'cut like a knife'

Longitudinal energy momenta waves [created by the use of spark gap technologies] are the EM energy forms created and radiated by Stars



The longitudinal alignment of E field momenta with their direction of propagation produces 'action-at-a-distance' and can produce material 'faster than light' velocities, if sufficient energies are inputted

The velocity of Electrical energy momenta

c

Transverse EM waves propagate at energy at the speed of light

Γ

Longitudinal EM waves can propagate energies & information in excess of the speed of light

The velocity of light is the limit for electrical energy acceleration

(the induced velocity of charged particles resulting from electric field energy-momenta interactions)

470,912,891 m/s

463,491,072 km/second < > 288,000 miles/second

$$v = [\pi/2]c$$

Longitudinal electrical fields can create near-instantaneous 'action-at-a-distance' EM fields

once established, these fields can transfer momentum and information at speeds faster than light through co-linear impulses of momentum

Wheatsone achieved renown by a great experiment
The measurement of the velocity of electrical Energy in a wire.

He cut the wire at the middle, to form a gap which a spark might leap across, and connected its ends to the poles of a Leyden jar filled with electricity. Three sparks were thus produced, one at either end of the wire, and another at the middle. He mounted a tiny mirror on the works of a watch, so that it revolved at a high velocity, and observed the reflections of his three sparks in it.

The points of the wire were so arranged that if the sparks were instantaneous, their reflections would appear in one straight line; but the middle one was seen to lag behind the others, because it was an instant later. The electricity had taken a certain time to travel from the ends of the wire to the middle.

This time was found by measuring the amount of lag, and comparing it with the known velocity of the mirror. Having got the time, he had only to compare that with the length of half the wire, and he could find the velocity of electricity.

His results gave a calculated velocity of 288,000 miles per second, i.e. faster than what we now know to be the speed of light

Charles Wheatstone

(6 February 1802 – 19 October 1875)

Wheatstone measured the velocity of LONGITUDINAL electrical energy using spark gaps

[as opposed to transverse waveforms produced by oscillating voltages]

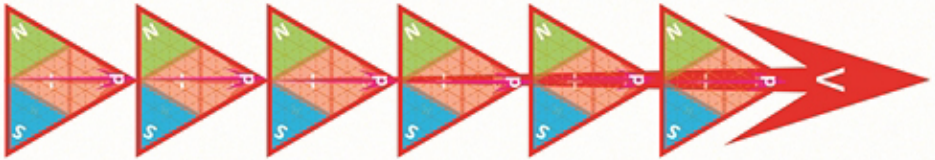
Voltage source [emf]

'Action at a Distance'

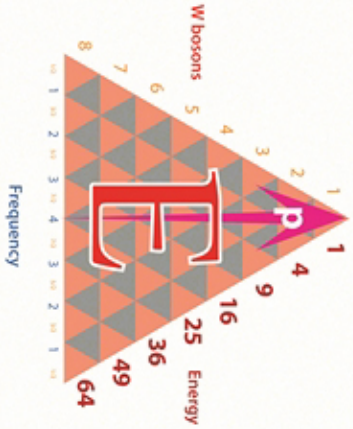
a source of mystery since it was first proposed by Newton as the basis for Gravitational attraction can be explained with Teslian Longitudinal waves

Positive longitudinal energy momenta

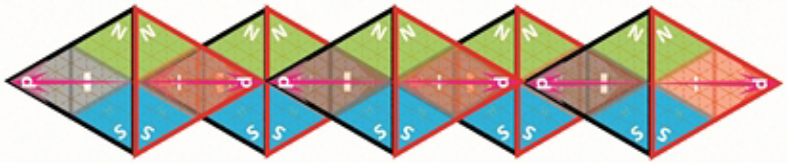
The ability of one source to affect the other depends on their respective potentials



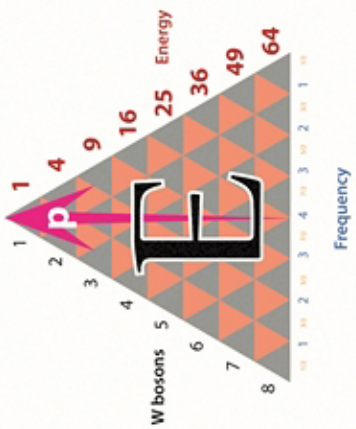
Increasing the Voltage of the discharges in the same time duration increases the total Momenta of the wave



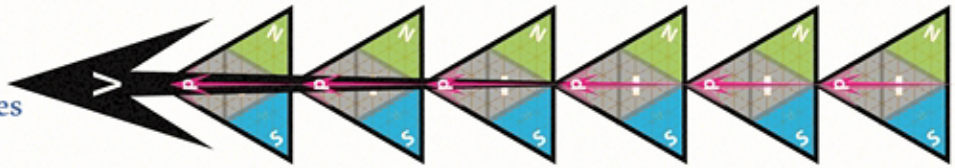
Bi-directional 'action at a distance'



'equal & opposite reactions'



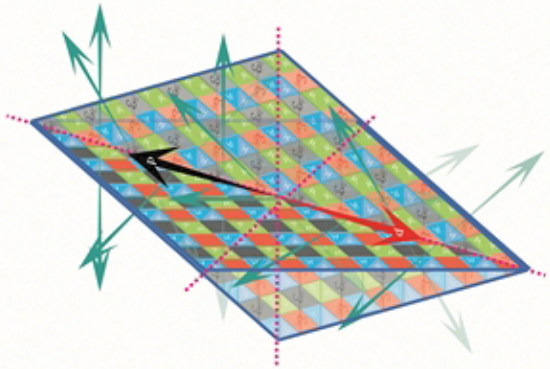
Longitudinal waves are produced by DC discharges and are unidirectional



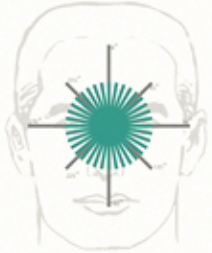
Once established bi-directional Longitudinal waves act as a 'instantaneous 'rigid conductor' of energy and information along their entire momenta length

Negative longitudal energy momenta

Longitudinal EM waves have their E-fields co-linear with their direction of propagation

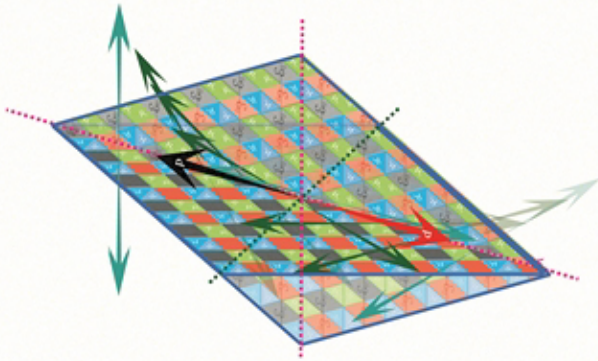


M field has NO preferential axial alignment (and can arrive at any angle)



Un-Polarised

Longitudinal Photons & EM waves are produced by disruptive spark gap discharges



M field has an alignment that follows a circular pattern (Clockwise or Counter-clockwise)

Circularly (or Elliptically) Polarised

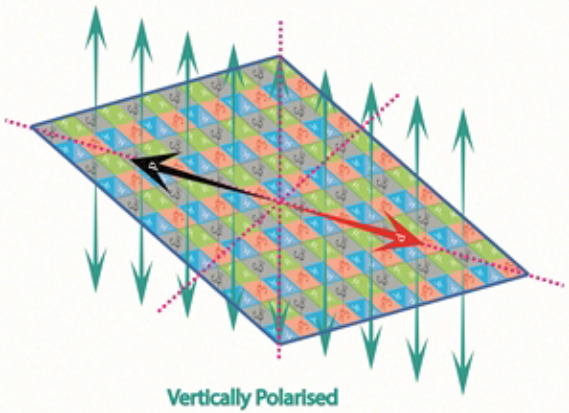
Longitudinal wave

polarisations

As a convention, the polarization of longitudinal EM waves must be described by specifying the orientation of the wave's magnetic field at a point in space over one period of the oscillation

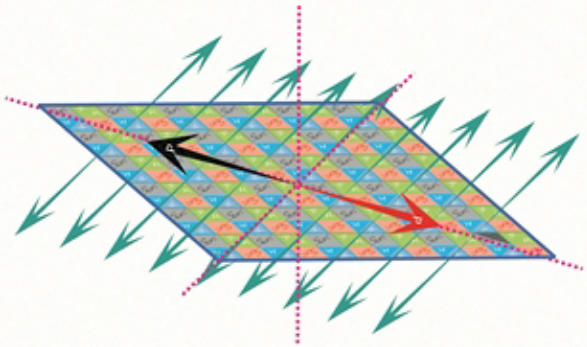
Longitudinal waves have their linear momenta aligned along their direction of propagation and are extremely efficient at accelerating charges they interact with, creating co-linear accelerations [parallel to their direction of field propagation] - they do not produce charge oscillations along their vector direction of propagation like transverse waves.

Examples of transverse waves include seismic P (primary) waves, and Tesla's longitudinal 'stinging' rays, whose electric fields and energy momenta are both co-linear with each other and parallel to the direction of energy transfer.



M field alignment is along the Vertical axis

Vertically Polarised

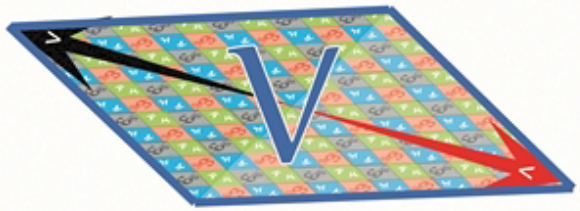


M field alignment is along the Horizontal axis

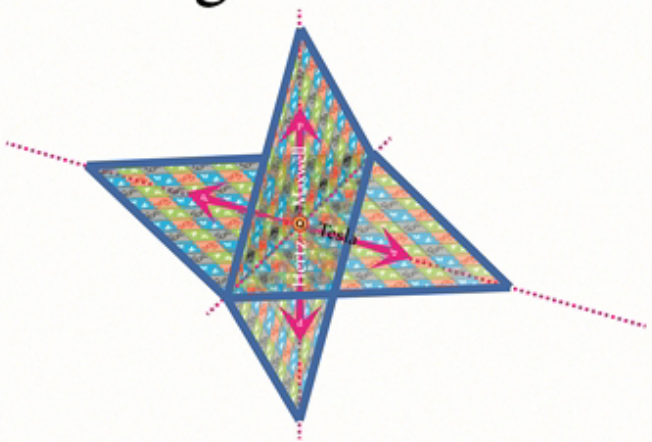
Horizontally Polarised

ElectroMagnetic waveforms

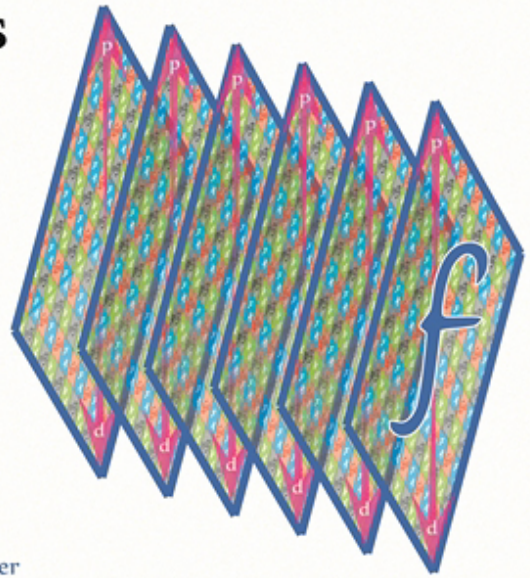
In Teslian longitudinal waves, produced by disruptive EM discharges, the E fields are co-linear with the direction of propagation



After inventing AC electricity Tesla investigated transferring energy through the air via electrostatic longitudinal waves to receiving devices. and noted the differing 'lethality' of the forces produced by these waves



Although comprised of the same energy momenta quanta
EM waves can be formed with Electric fields perpendicular to each other
thus leading to conflicting theories of EM wave propagation



Hertzian transverse waveforms have their EM fields perpendicular to the direction of propagation

In 1887, Heinrich Hertz demonstrated the reality of Maxwell's electromagnetic waves by experimentally generating radio waves in his laboratory

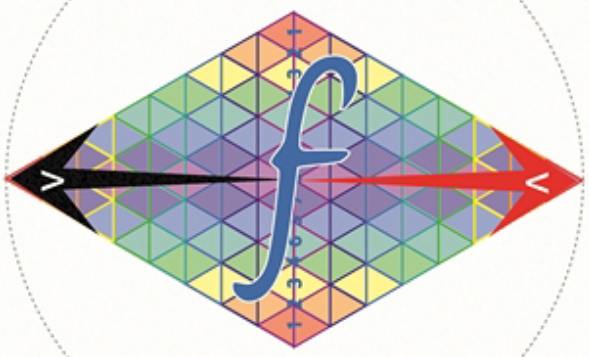
T

Teslian waves transmit Energy in a LONGITUDINAL waveform producing 'action-at-a-distance'

Nikola Tesla

(10 July 1856 – 7 January 1943)

W/m^2



108 Mx = 1 J/A = 1 V·s = 1 Wb = 1 T·m2

c^2 sec

Heinrich Hertz

(22 Feburary 1857 - January 1 1894)

Hz

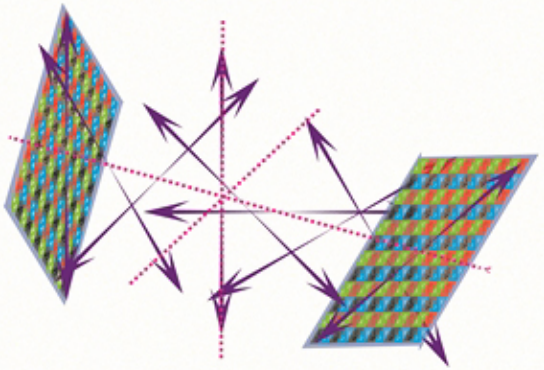
Hertzian waves transmit Energy in a TRANSVERSE waveform producing 'radio waves'

Volt Seconds [per metre²]

Cycles per Second

Soon after Hertz's claim of discovering Maxwell's transverse EM waves Tesla visited him and personally demonstrated the experimental error to him.
Hertz agreed with Tesla and had planned to withdraw his claim, but varying agendas intervened and set the stage for a major rift in the 'accepted' theories

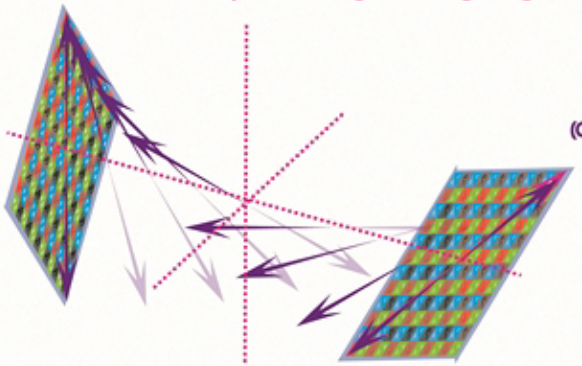
Transverse EM waves have their E&M fields orthagonal with their direction of propagation



E field has NO preferential axial alignment (and can arrive at any angle)

Un-Polarised

Transverse Photons & EM waves are produced by accelerating/oscillating charges



E field has an alignment that follows a circular pattern (Clockwise or Counter-clockwise)

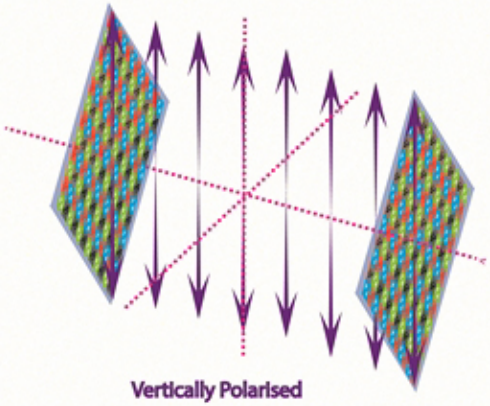
Circularly (or Elliptically) Polarised

Transverse wave polarisations

By convention, the polarization of EM waves is described by specifying the orientation of the wave's electric field at a point in space over one period of the oscillation

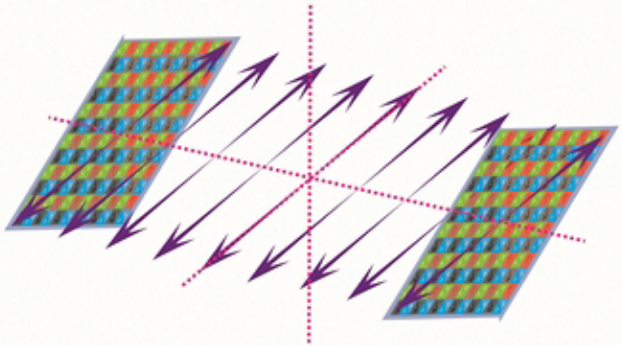
Transverse waves are inefficient propagators of EM energy as they apply their linear momenta tangentially to the charges they interact with, creating lateral accelerations [orthagonal to their direction of field propagation] - they do not accelerate charges along their vector direction of propagation like longitudinal waves.

Examples of transverse waves include seismic S (secondary) waves, and electromagnetic plane wave, whose electric (E) and magnetic (M) fields both oscillate perpendicular to each other and orthogonal to the direction of energy transfer.



E field alignment is along the Vertical axis

Vertically Polarised



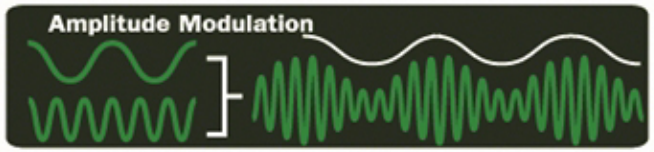
E field alignment is along the Horizontal axis

Horizontally Polarised

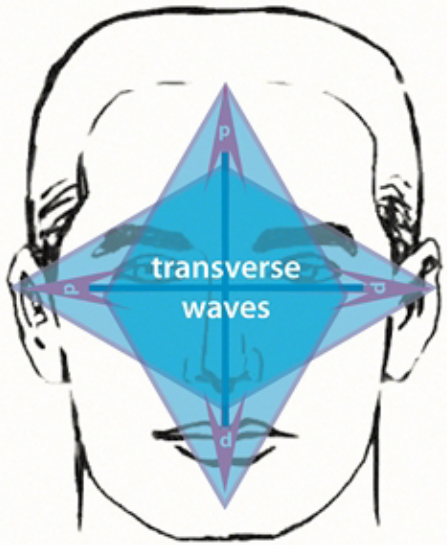
EM wave modulations

In telecommunications, modulation is the process of varying one or more properties of a periodic waveform, called the carrier signal, with a modulating signal which typically contains information to be transmitted

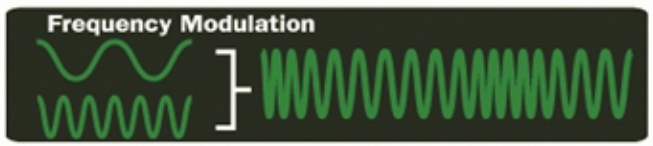
Amplitude modulation



the amplitude of the carrier signal is varied



the frequency of the carrier signal is varied



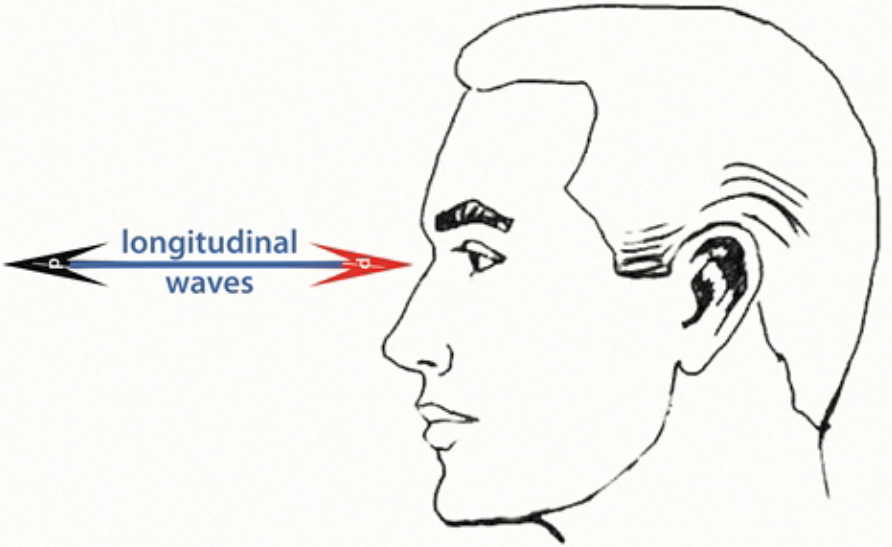
Frequency modulation

In addition to planar Hertzian waves
there exists Longitudinal EM waves

Impulse propagation

As the voltage [energy/coulomb] of longitudinal waves increases their co-linear energy-momenta increase and these forces provide a mechanical basis for near instantaneous 'action-at-a-distance'

Impulse propagation is distinct from pulse modulations



a narrowband analog signal is pulsed over an analog baseband channel

PCM Pulsed modulation TDM

Transverse EM wave production

Alternating the Voltage potentials in an electrical circuit produces an Alternating Current
of electrons with Kinetic EM energies reflective of the Time-Energy duration of the AC circuit

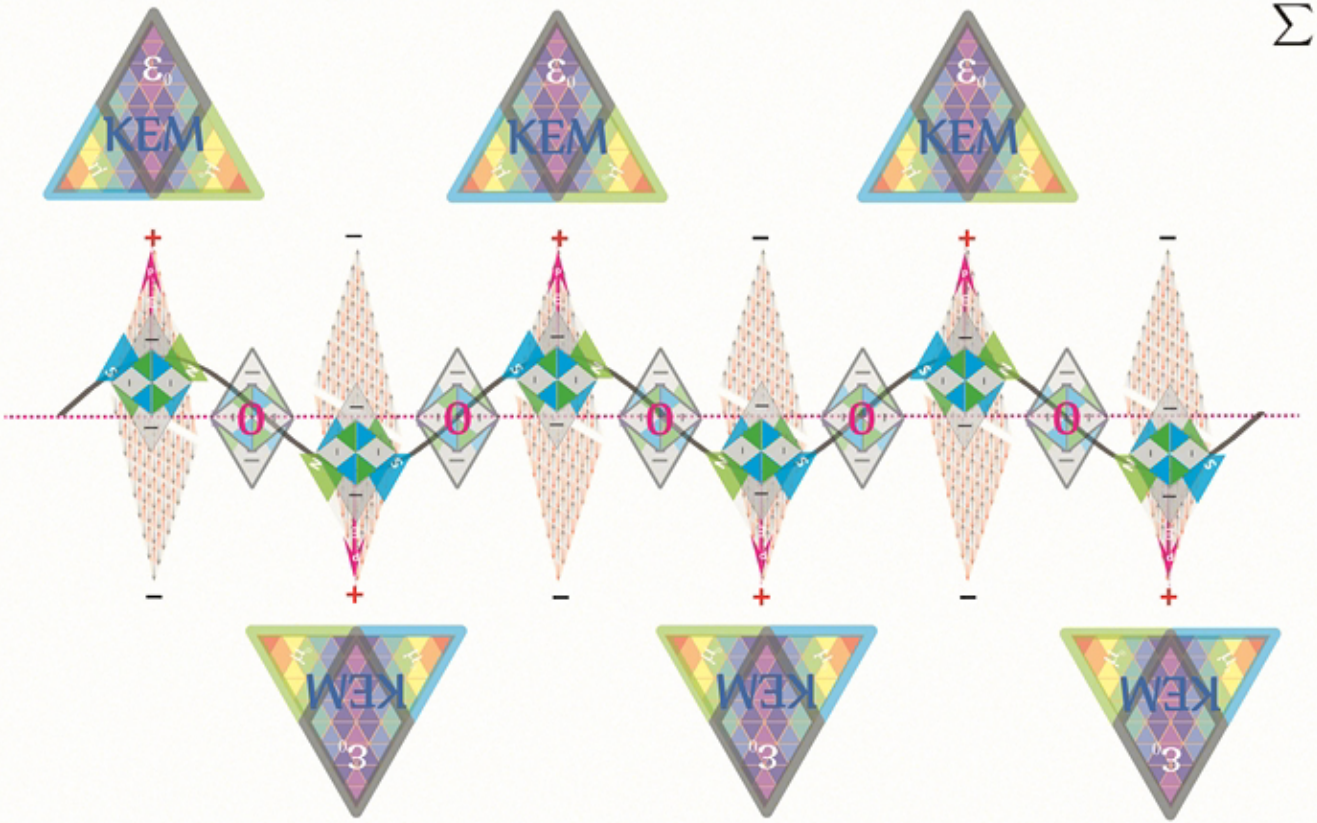
Alternating Voltages provide an electromotive force to Electrically charged Particles producing tranverse Kinetic Energy fields with orthagonal Magnetic fields

Kinetic Energies from motion
(diverge from rest Matter)

F=ma

$$\sum \mathbf{F} = \frac{d\mathbf{p}}{dt} = m\frac{d\mathbf{v}}{dt} + \mathbf{v}\frac{dm}{dt}$$

All Stationary charged particles have
NO extrinsic Magnetic moment
ie. They are Electro-static



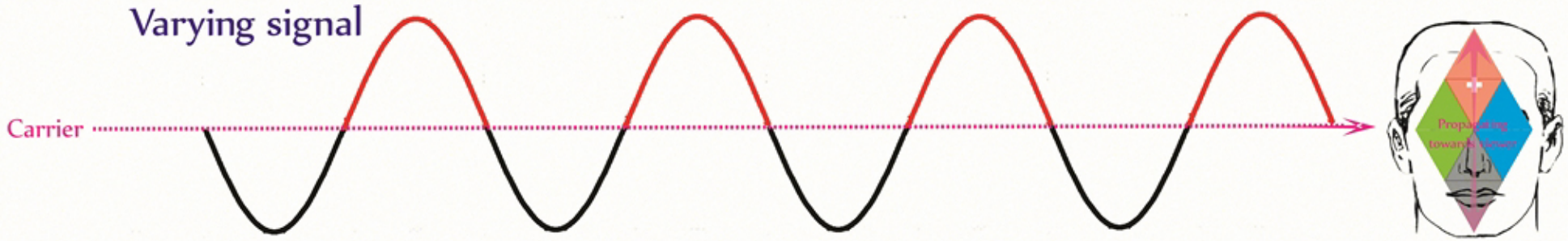
Charges with constant velocities
produce
REACTIVE [K]EM FIELDS

Any change to the momentum of a charged particle in motion requires a corresponding quantum level energy-momentum change through the emission/absorption of quantised EM mass-ENERGY momenta in the form of W bosons

Accelerating Charges
produce
RADIANT EM WAVES

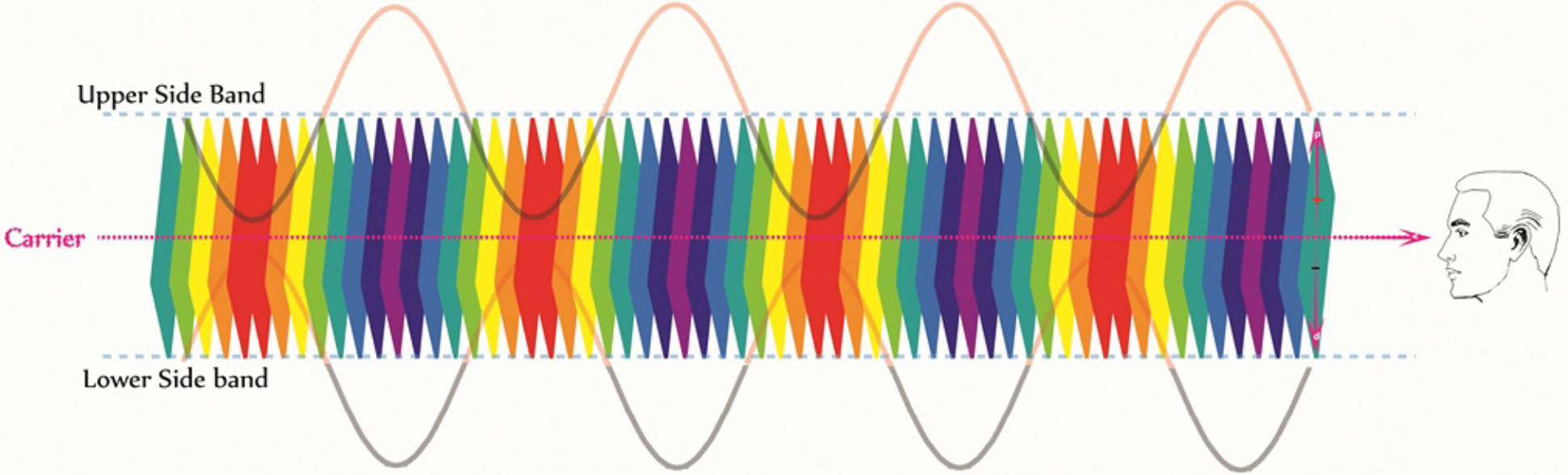
Modelling of planar transverse waves

(of varying amplitudes)



AM waveform

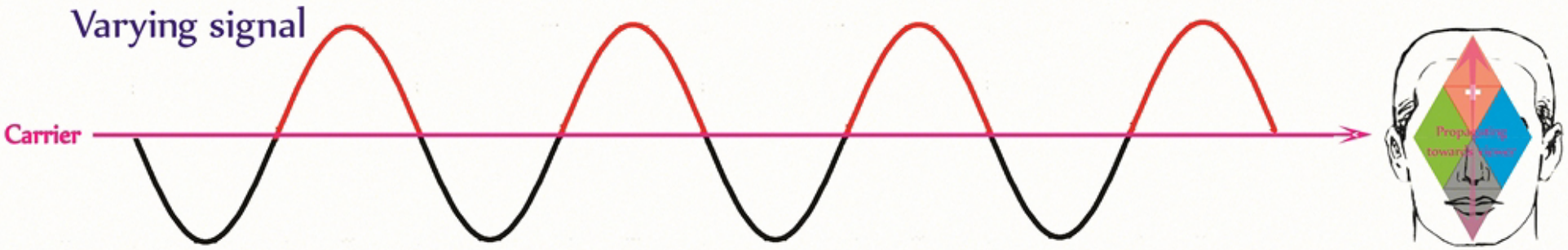
Amplitude Modulation (AM) works by varying the strength of the transmitted signal in relation to the information being sent.



Note: In amplitude modulation each colour planar wave contains differing energy momenta [n1-red to n8-violet]

Modelling of planar transverse waves

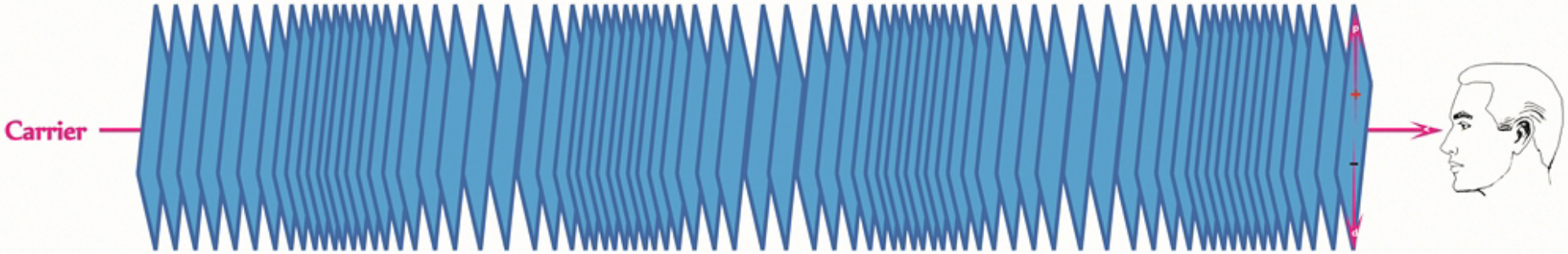
(of the same frequencies)



FM waveform

Frequency modulation (FM) is a form of modulation which conveys information over a carrier wave by varying its frequency (in contrast with amplitude modulation, in which the amplitude of the carrier is varied while its frequency remains constant).

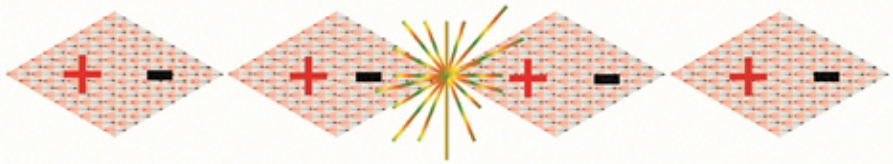
In analog applications, the instantaneous frequency of the carrier is directly proportional to the instantaneous value of the input signal



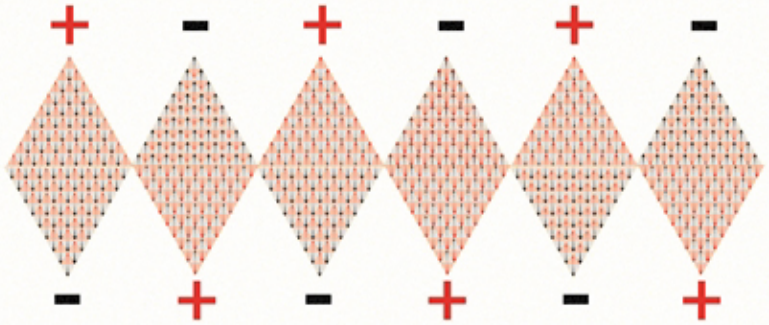
Note: In Frequency modulation all the planar waves have the same energy momenta [only the number of waves per sec varies]

ElectroMagnetic waves

Mathematics alone [without a correct foundational geometry] is insufficent to describe EM radiation
EM waves can be Longitudinal or Transverse with respect to their direction of propagation



Tesla



Maxwell - Hertz

It is now clear [using Tetryonic geometry] that both Tela and Maxwell were correct in their opposing theories of EM waveforms
with Tesla proposing Longitudinal waves [from experiment] and Maxwell proposing Transverse waves [from his equations].

The differing opinions on the EM waveforms is shown to be a direct result of the sources of EM wave generation employed in their creation.
After the discovery of the photo-electric effect Hertz and others moved to oscillating charges to produce Transverse [planar] waves
while Tesla continued to investigate and utilise the older spark gap technology to produce Longitudinal waves

Spark Gaps & Plasma discharges
produce
longitudinal EM radiation

Accelerating charges
produce
transverse EM radiation

Transmitter

Action-at-a-Distance

Radio waves

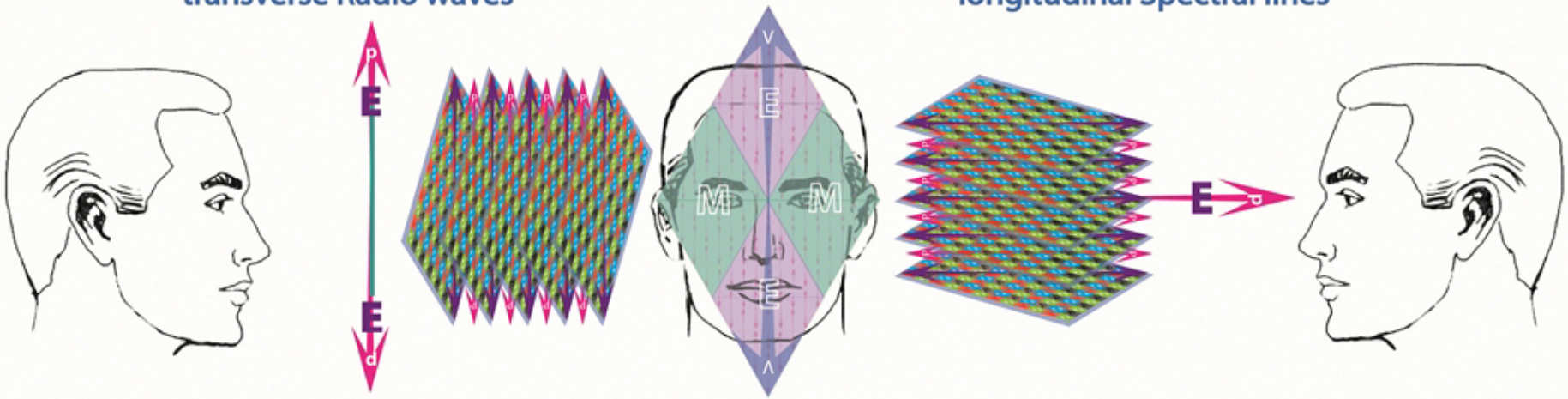
Reciever

In order to explain and advance our understanding of all EM phenomena we must return to, and utilise, the older discharge technologies

Planar electromagnetic waves

In the physics of wave propagation, a plane wave (also spelled planewave) is a wave whose wavefronts are infinite parallel planes of peak-to-peak amplitude normal to the phase velocity vector.

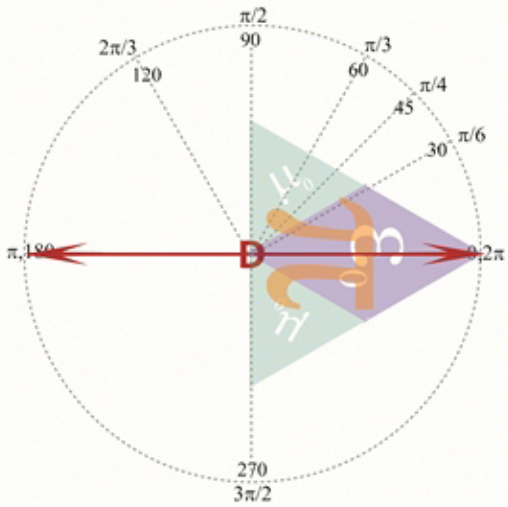
transverse Radio waves



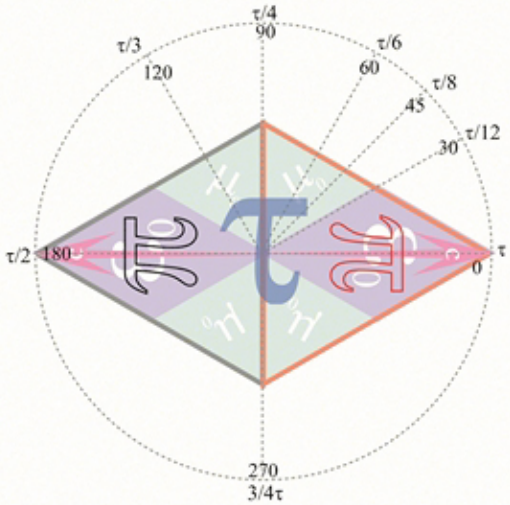
longitudinal Spectral lines

The phase relationships of their EM energy momenta can all be finally visualised and drawn through Tetryonic theory geometries

[with appropriate radian units]



bosons $2\pi[h\nu] = hf$ photons



τ is a more 'natural' radian unit for describing EM waves than π
tau = 2π = 360 degree rotation about a point

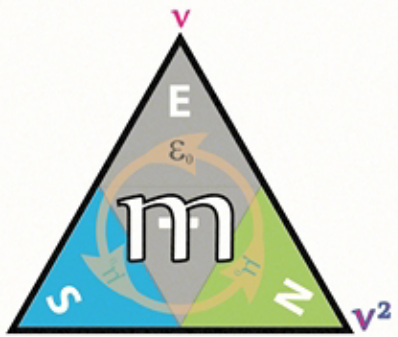
Lorentz co-ordinate transforms

In physics, the Lorentz transformation (or transformations) are named after the Dutch physicist Hendrik Lorentz.

The transformations describe how measurements of mass-energies in space and time by two observers are related through mathematics

It was the result of attempts by Lorentz and others to explain how the speed of light was observed to be independent of the reference frame, and to understand the symmetries of the laws of electromagnetism.

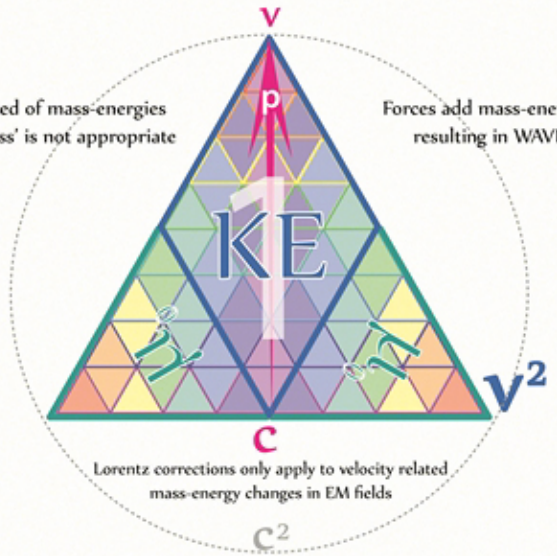
All photons are comprised of two dual-sided equilateral Planck quanta



All EM waves are comprised of neutral charge quanta called Photons

Photons are comprised of mass-energies and the term 'mass-less' is not appropriate

Forces add mass-energies to KEM fields resulting in WAVElength changes



Lorentz corrections only apply to velocity related mass-energy changes in EM fields

Linear correction factor

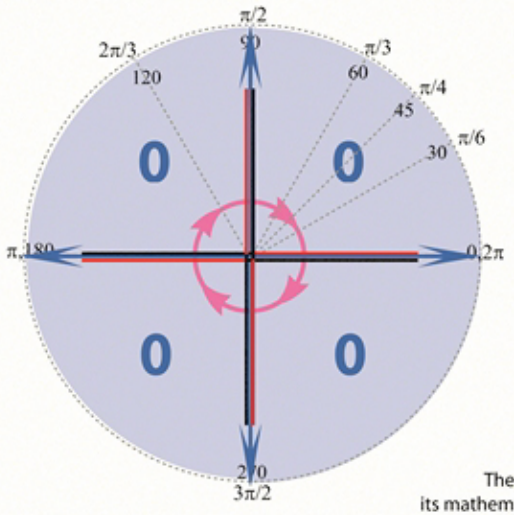
$$\beta = \left[\frac{v}{c}\right]$$

Linear Lorentz boosts produce changes to the velocity and momenta of a system

Scalar correction factor

$$\beta^2 = \left[\frac{v^2}{c^2}\right]$$

As the velocity and momenta of a system changes so does its scalar energies



The Lorentz transformation is a linear transformation

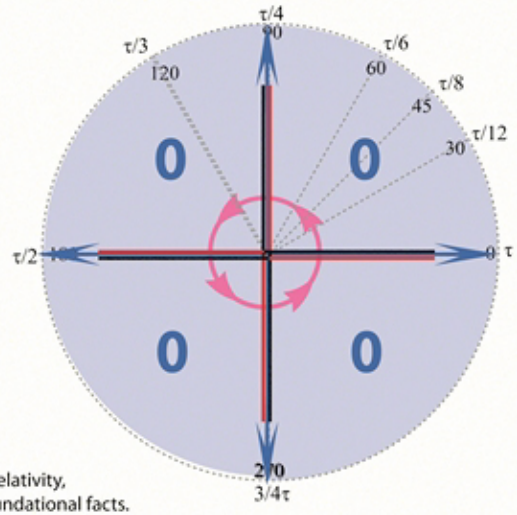
It may include a rotation of space;
a rotation-free Lorentz transformation is called a Lorentz boost.

bosons $2\pi[h\nu] = hf$ photons

π

As photons are neutral charge mass-energy geometries care must alway be taken in identifying and specifying the planar wavefront polarities and direction of wave propagation when developing co-ordinate systems to describe their motions and resulting electromagnetic properites

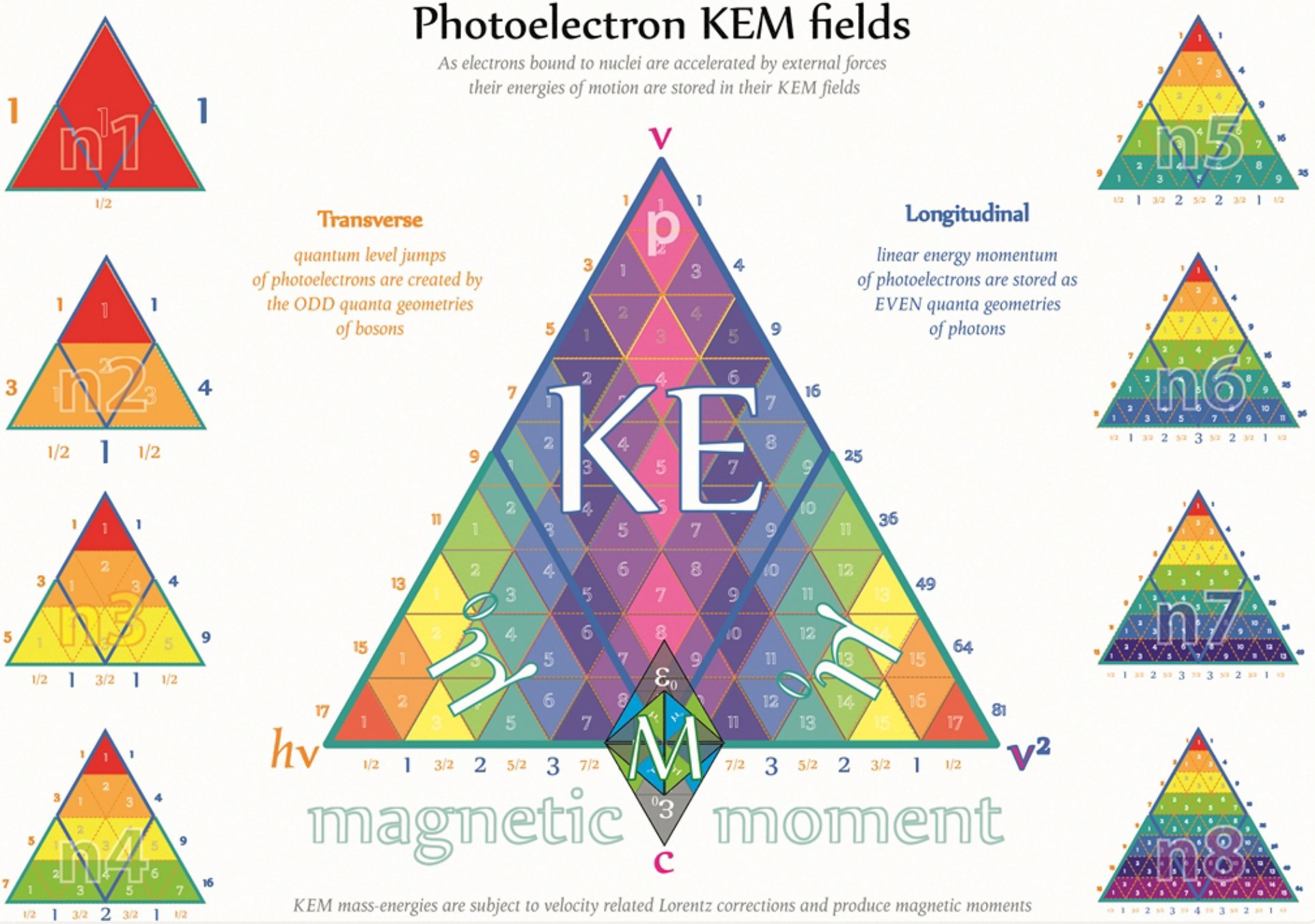
τ



The Lorentz transformation is in accordance with special relativity, but was derived well before special relativity, its mathematical development in relativity theory has resulted in erroneous assumptions being accepted as foundational facts.

Photoelectron KEM fields

As electrons bound to nuclei are accelerated by external forces their energies of motion are stored in their KEM fields



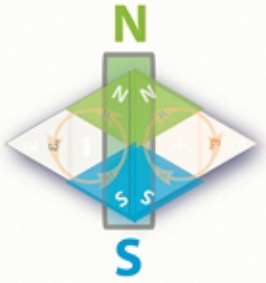
KEM mass-energies are subject to velocity related Lorentz corrections and produce magnetic moments

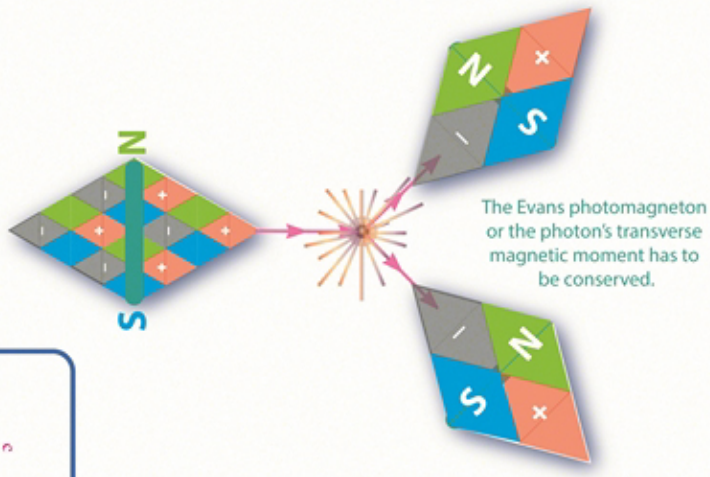
Kinetics & Photons

The photon has several properties that distinguish it from all other subatomic particles.

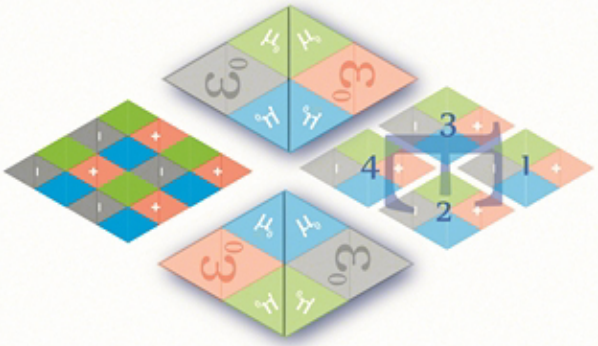
It is the only elementary particle wherein a high-energy photon can transform/split into two or more low-energy photons.

A photon is a magnetic dipole. It is an elementary magnet. Evans discovery of the photon's longitudinal magnetic field in 1992 is considered as significant as Einstein's discovery of Relativity.

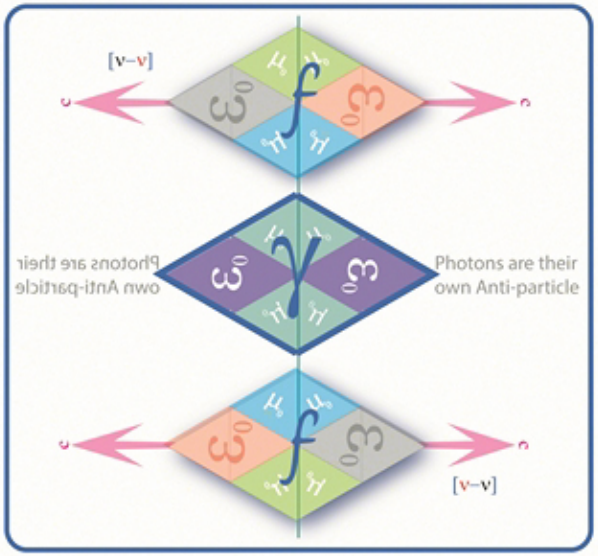




The Evans photomagneton or the photon's transverse magnetic moment has to be conserved.



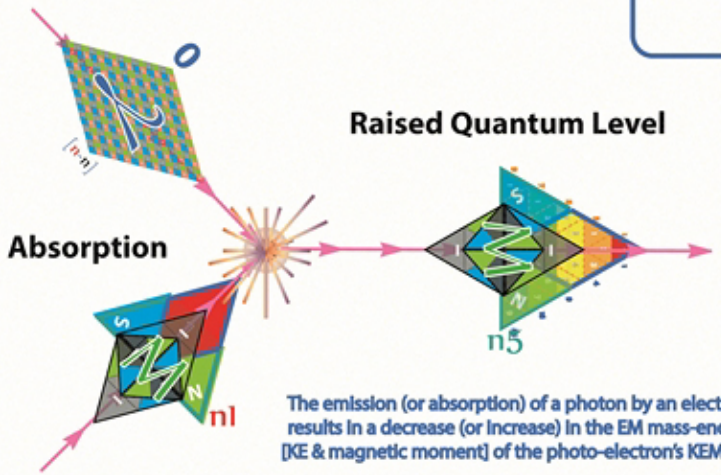
Photons can form super-position EM waves



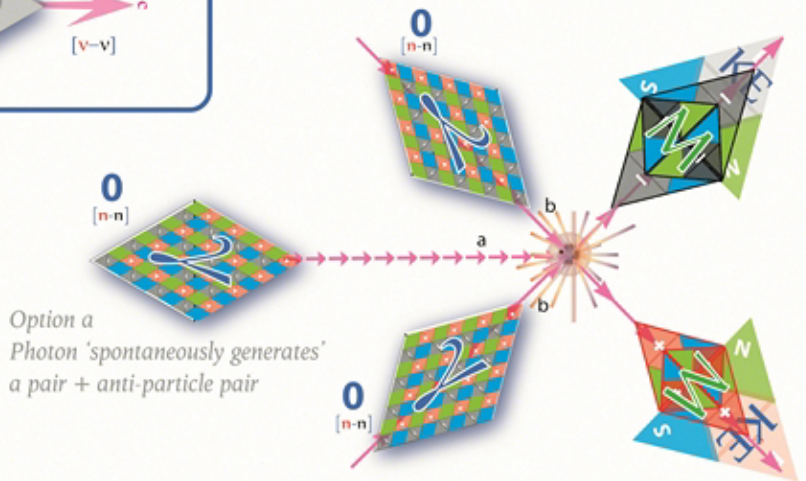
PAIR PRODUCTION
A photon with sufficient energy can be transformed into a real electron-positron pair.

The EM mass-energy is conserved as per Einstein's equivalence of mass and energy.

The photon's magnetic charge is conserved in the magnetic moments of the created electron-positron pair.



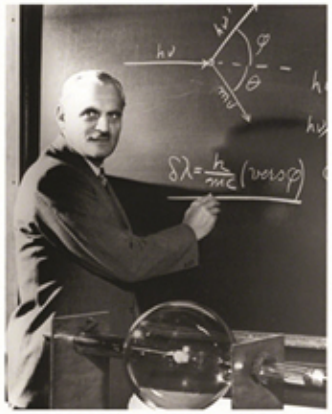
The emission (or absorption) of a photon by an electron, results in a decrease (or increase) in the EM mass-energy [KE & magnetic moment] of the photo-electron's KEM field



Option a
Photon 'spontaneously generates' a pair + anti-particle pair

Option b
Two Photons combine

Arthur Compton



(September 10, 1892 – March 15, 1962)

Compton Scattering

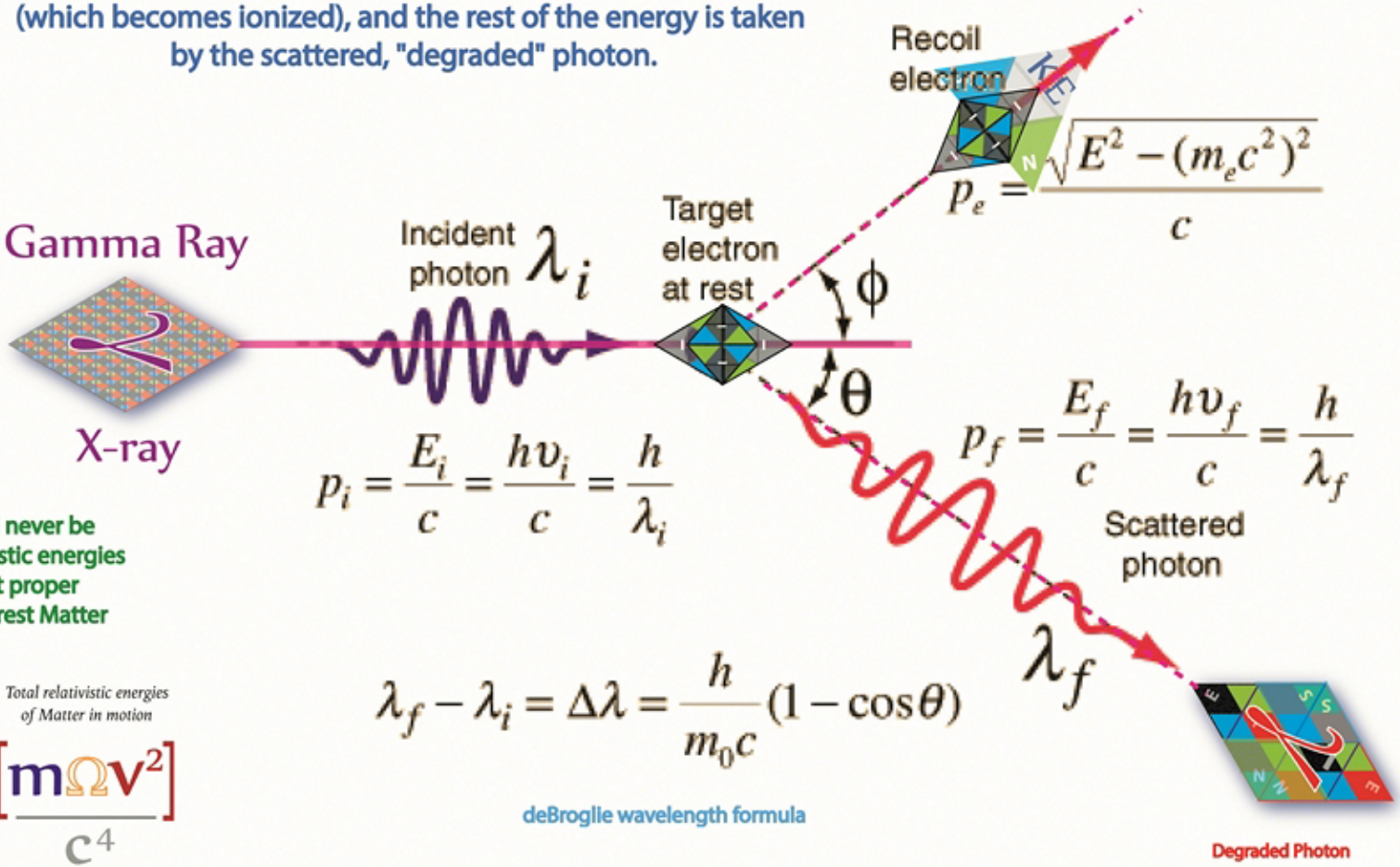
The in-elastic scattering of photons in matter results in a decrease in energy (increase in wavelength) of an X-ray or gamma ray photon and is called the Compton effect.

Part of the energy of the X/gamma ray is transferred to a scattering electron, which recoils and is ejected from its atom (which becomes ionized), and the rest of the energy is taken by the scattered, "degraded" photon.

Compton frequency of photons

$$E = hf = \frac{hc}{\lambda} = mc^2$$

where v = c



Lorentz corrected energies of EM masses in motion

$$n\pi\left[\frac{m\Omega v^2}{c^2}\right]$$

Compton frequencies should never be calculated from the total relativistic energies of Matter in motion without proper consideration of the invariant rest Matter

Total relativistic energies of Matter in motion

$$n\pi\left[\frac{m\Omega v^2}{c^4}\right]$$

$$\lambda_f - \lambda_i = \Delta\lambda = \frac{h}{m_0 c}(1 - \cos\theta)$$

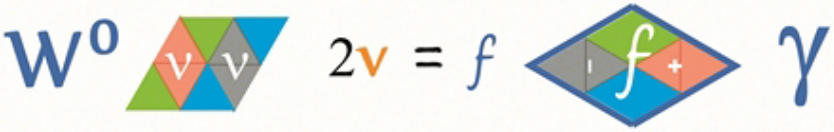
deBroglie wavelength formula

Pair Production

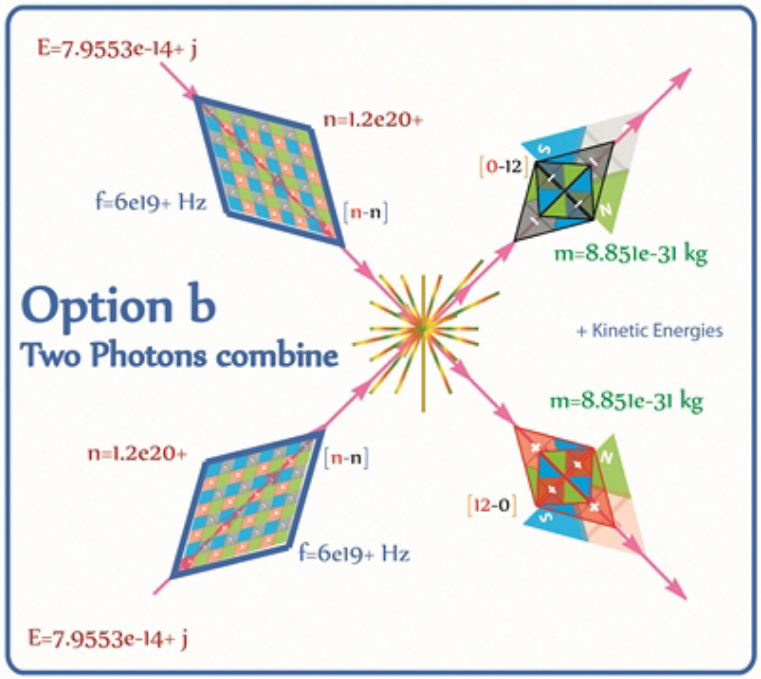
$$mv^2 = E = \tfrac{1}{2}hf$$

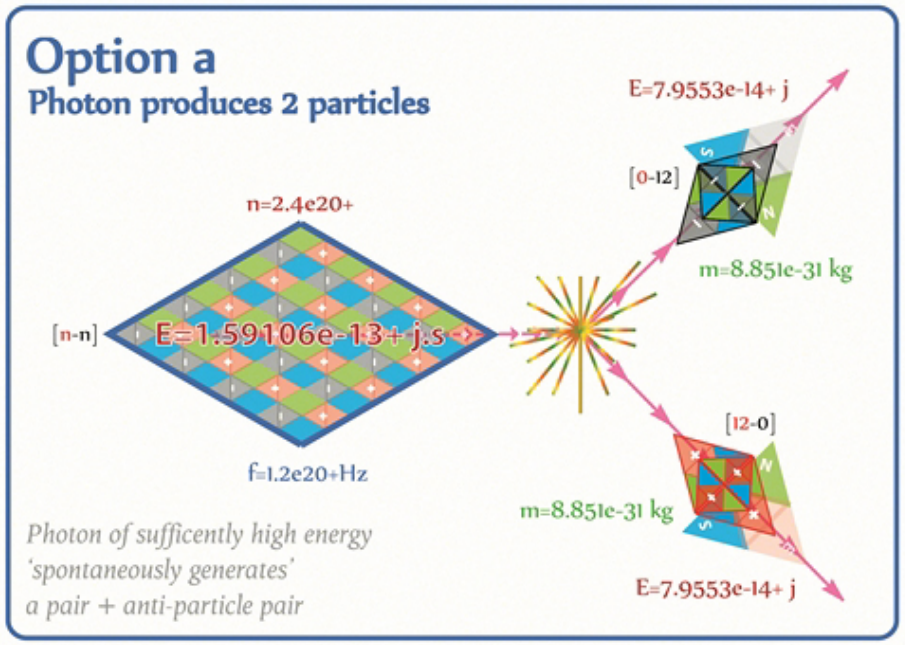
A photon with sufficient energy can be transformed into a real, material electron-positron pair.

The EM mass-energies of the system are conserved as per the equivalence of mass and Energy.



The photon's magnetic dipole and charges are also conserved (but in differing charge geometries)





Planck's constant	Energy	electron rest mass-Matter
6.62432672 e-34 kgm^2/s	7.9553 e-14 j	8.8514860 e-31 kg

$$n\pi\left[m\Omega v^2\right]_{\text{mass velocity}}^{\text{Planck quanta}} = E = T\pi\left[m\Omega v^2\right]_{\text{mass velocity}}^{\text{Planck quanta}}$$

6 e19	1.2 e20
photon frequency	Compton frequency

All pair production - annihilations must follow the mass-Energy-Matter equivalency formula

mass c^2 ← *per second* E *per second squared* → c^4 Matter

Kinetic Energies

$$KE = \tfrac{1}{2}Mv^2$$

As velocity increases so does the number of energy momenta quanta per spatial geometry

Photons contain Kinetic energies and momentum

Photonic Energy

$$E_\gamma = 2\pi\left[\left[m\Omega v^2\right]\right]$$

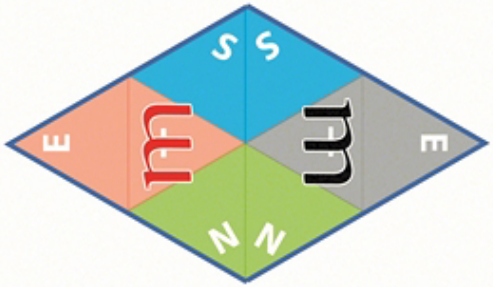
Planck quanta

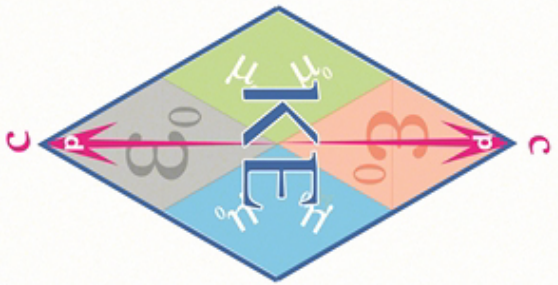
mass velocity

Kinetic Energy and momenta are all related through Tetryonic geometry

Photons

$$p = \frac{h}{\lambda} = \frac{E}{c}$$





$$E = hf$$

Momentum

$$\frac{p^2}{2m} = KE = \tfrac{1}{2}Mv^2$$

As the number of Photons increases so does the Momentum

$$p = n\pi\frac{\left[\left[m\Omega v^2\right]\right]}{v} = E/v$$

Planck quanta

mass velocity

All Photons travel at the 'speed of light' in their medium of transmission

$$p = \frac{E}{c} = \frac{hv}{c} = \frac{h}{\lambda}$$

$$p = n\pi\left[\left[m\Omega v\right]\right]$$

Planck quanta

mass velocity

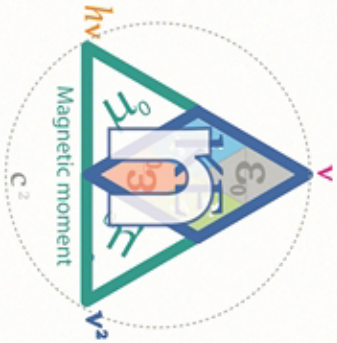
linear energy-momentum

Electronic Kinetic Energies

have discrete energy levels within the nucleus and
continuous energy levels in unbound electrons

Boson exchanges between quantum levels provides the basis for all electron - photon interactions

$0.211\ eV / n^2$



Relativistic KEM formula must always remove Invariant rest Matter PRIOR to Lorentz correction being applied

$$KEM = RE - mc^2$$

As rest Matter is Invariant and the Lorentz factor applies to EM waves only

$$KEM = 4\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field (ElectroMagnetic) · Planck quanta (mass, velocity)

Electric & Magnetic energies are contained in the KEM field geometry extending from all Matter topologies in motion

n0 — 12 [0-12] — 1.2e20 — 0 eV — Rest Matter

n1 — 0.211 eV — Lyman

n2 — 0.276 eV — Balmer

n3 — 0.375 eV — Paschen

n4 — 0.541eV — Brackett

n5 — 0.845 eV — Pfund

n6 — 1.502 eV — Humphreys

n7 — 3.381 eV — Un-named

n8 — 13.525 eV

$$\frac{p}{h} = \tilde{\nu}$$

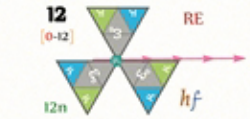
Wave numbers are the inverse of Wavelengths

$$\frac{h}{p} = \lambda$$

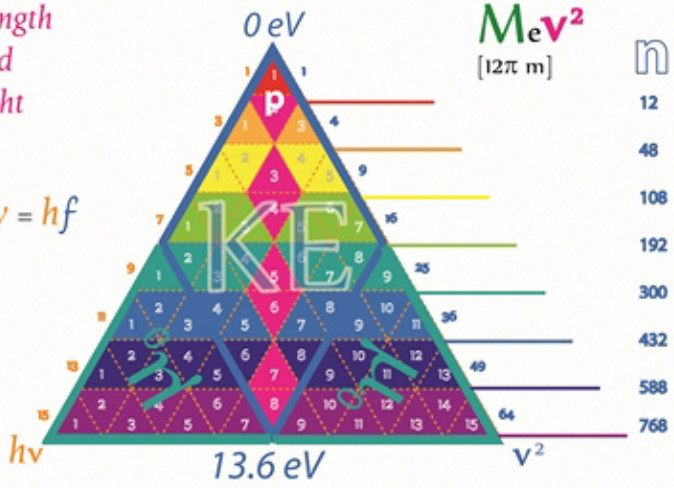
Frequency and Wavelength are inversely related via the Speed of Light

$$\frac{m\Omega v^2}{h} = f$$

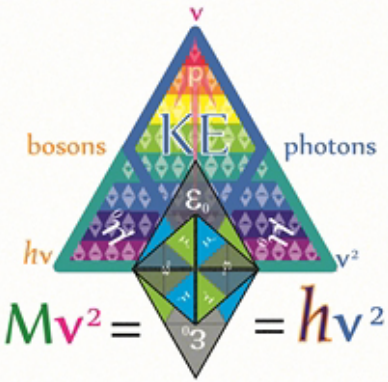
$$2m\Omega v = hf$$



$$\frac{Mv^2}{c^2} = KEM = \frac{hv^2}{c^2}$$



Photonic energy
momenta of KEM fields



Rydberg's formula is a wavenumber equivalent re-expression of Lorentz's velocity correction formula as it applies to the quantised energy momentum of Photo-electrons bound in atomic nuclei

$$\frac{1}{\lambda} = \frac{R_H}{hc}\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

The difference of two inverse squared KEM energies

Rydberg

$$R\left(\frac{1}{1} - \frac{1}{4}\right)_{.75}$$

Tetryonic

$$= R\left(36/48\right)_{.75}$$

n1 and n2 are integers greater than or equal to 1 such that n1< n2

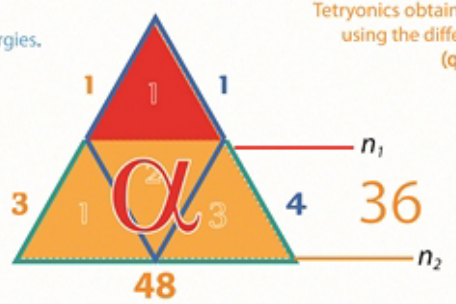
$$\frac{1}{2}Mv^2 = KE = hcR$$

Whereas Rydberg calculated for wavenumbers using the difference of two inverse squared KEM energies. (inverse wavelengths)

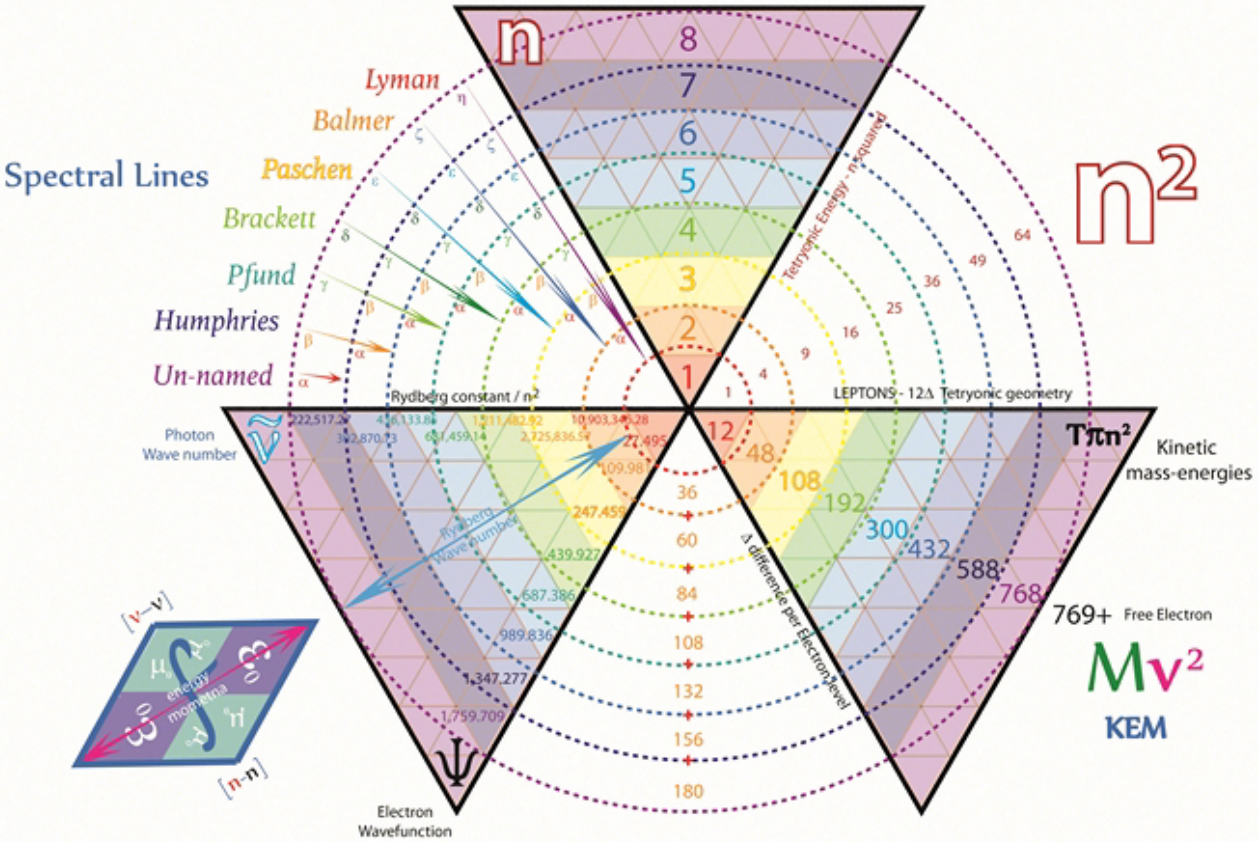
$$\left(\frac{1}{1} - \frac{1}{4}\right)_{.75}$$

A mathematical solution that works but whose physical mechanics has eluded explanation

Tetryonics obtains the same answers geometrically using the difference of the two KEM energies. (quanta differentials)



(36/48)
.75

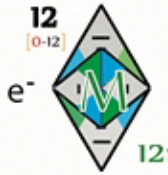


Any changes to the Energy momenta of the electron's KEM field must be reflected in the Energy momenta of the Photo-electrons emitted [absorbed]

$$\pm\Delta hv = KEM_i - KEM_f$$

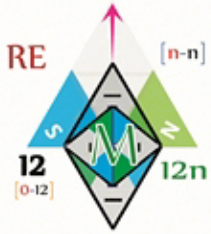
The difference of two KEM energies

Kinetic Energies of Photoelectrons



rest Matter

Kinetic energies are DIVERGENT from Matter topologies



Relativistic mass-energies

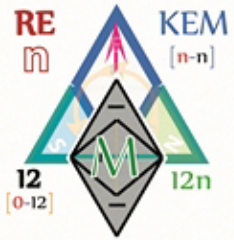
rest Matter + Kinetic Energies

The total energy of a photon is absorbed into the electron's KEM field geometry

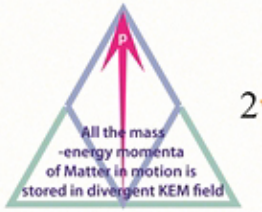
All velocity changes produce changes to mass-energies, momenta and wavefunction relationships

$$KEM = M\nu^2$$

rest Matter is velocity invariant



$1e19\nu = \mathbb{n}$



$2\nu = f$

6.62943 e -34 J.s

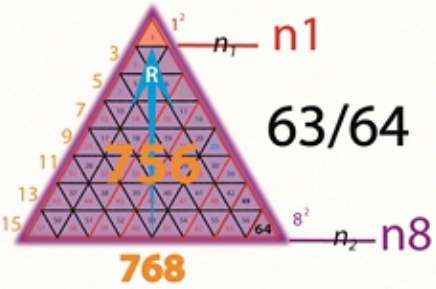
13.5252 eV
2.1669 e -18 J

$$E = h\nu^2$$

3.26874 e15 quanta

KEM fields are velocity variant

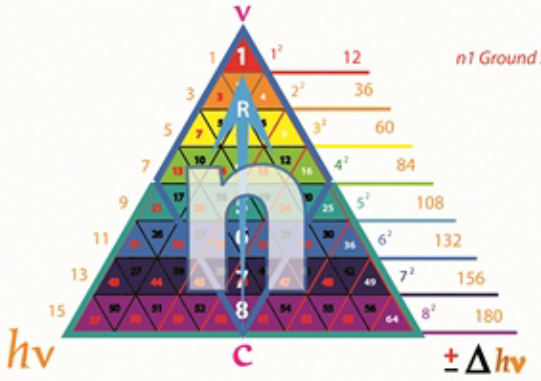
Δp



$$4\pi \underset{\text{KEM field}}{} \left[\underset{\text{ElectroMagnetic}}{[\varepsilon_0 \mu_0]} . [\underset{\text{mass}}{m} \underset{\text{velocity}}{\Omega \nu^2}] \right]$$

EM Field · Planck quanta

Electron KEM Quantum levels



Rydberg spectral transition jumps

$$R_H\left(\frac{1}{1} - \frac{1}{64}\right) = \frac{1}{\lambda} = KEM\left(\frac{63/64}{1}\right)$$

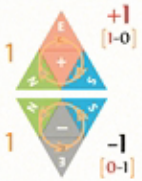
Rydberg .984375 · Tetryonic .984375

Spectral line energies

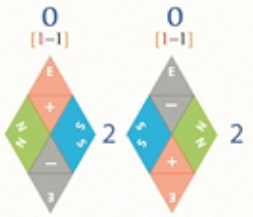
$1\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$ (Charge; EM Field: ElectroMagnetic; Planck quanta: mass, velocity)

ZPF

ZPF



Each quantum level transition requires kinetic energies with an ODD number of EM mass-energy momenta quanta [bosons - charge carriers]



γ $2\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$ (Photons; EM Field: ElectroMagnetic; Planck quanta: mass, velocity)

$n.h\nu$

Bosons are

Odd number Charge carriers

In order to transistion between levels for each emission and absorption leptons must release or absorb specific W bosons (neutral Z bosons - photons) for each KEM field change

Photons are

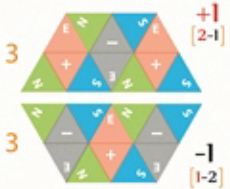
Even number EM force carriers

$n.hf$

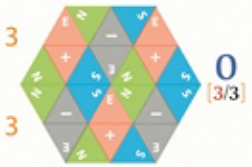
$\text{ODD}\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$ (Bosons; EM Field: ElectroMagnetic; Planck quanta: mass, velocity)

W+

W-



Pairs of charged W bosons combine to form neutral bosons / photons [EM induction]



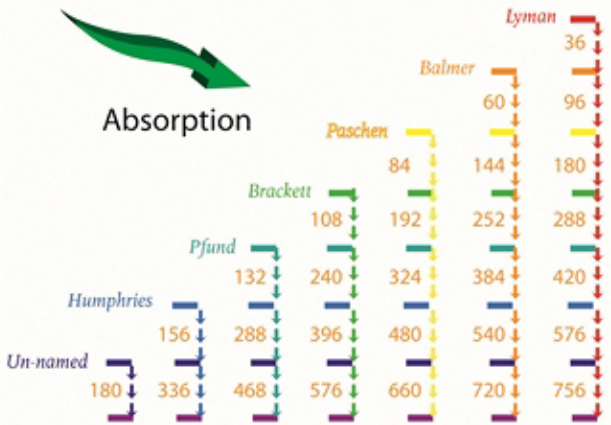
W^0 $\text{EVEN}\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$ (EM waves; EM Field: ElectroMagnetic; Planck quanta: mass, velocity)

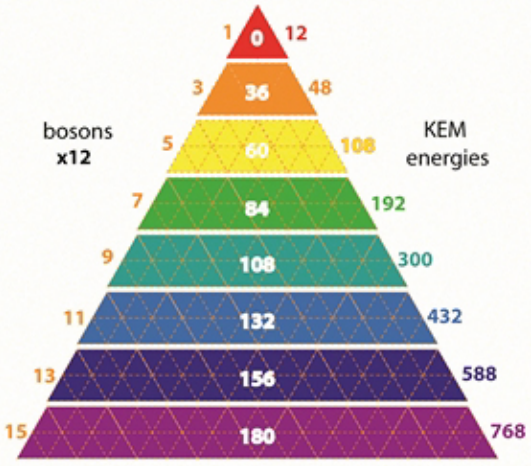
KEM field Differentials

Bosonic quantum level changes

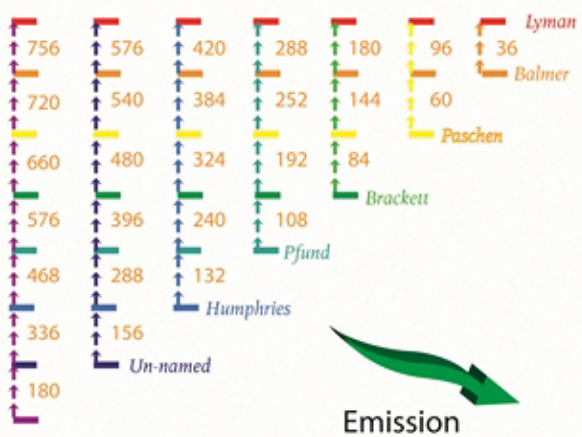
Mv^2

Absorption





Mv^2



Emission

All quantum level changes are the result of boson increases or decreases

Quantum level differentials

The exact number of Kinetic energy quanta (ZPFs) required for each bound electron transition within a nucleus

$$\frac{1}{\lambda} = \frac{R_H}{hc}\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

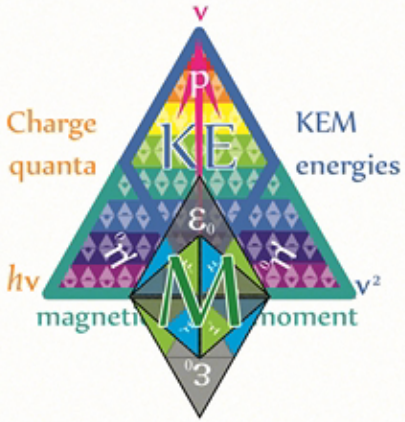
Ryberg calculated this as the wavenumber differerential of two inverse squared energies

Rydberg

$$n_f^2 \qquad R_H\left(\frac{1}{1} - \frac{1}{4}\right)_{.75} = R_H\left(36 \diagup 48\right)_{.75} \qquad n_i^2$$

Tetryonic

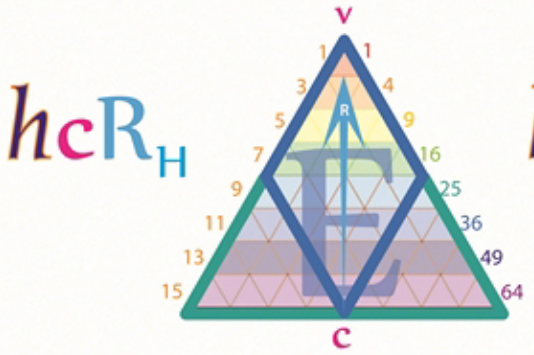
Tetryonic geometry reveals it to be sum of ODD Integer bosons between two squared KEM energies



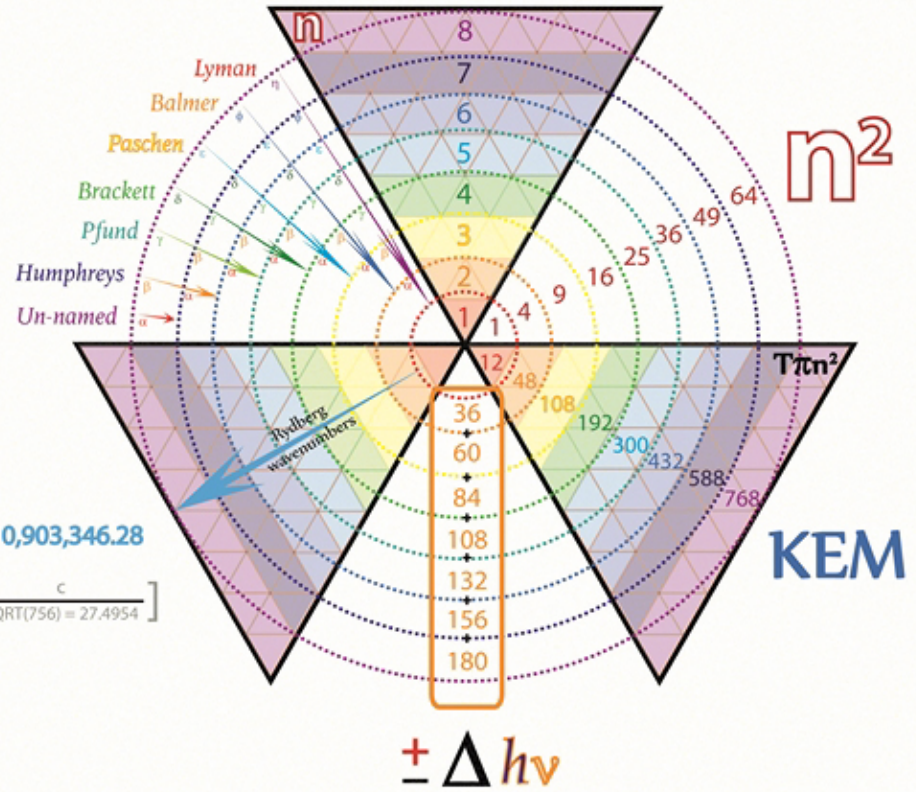
Each Quantum level jump within an Atomic Nuclei is discrete and requires an exact number of EM mass-energy quanta

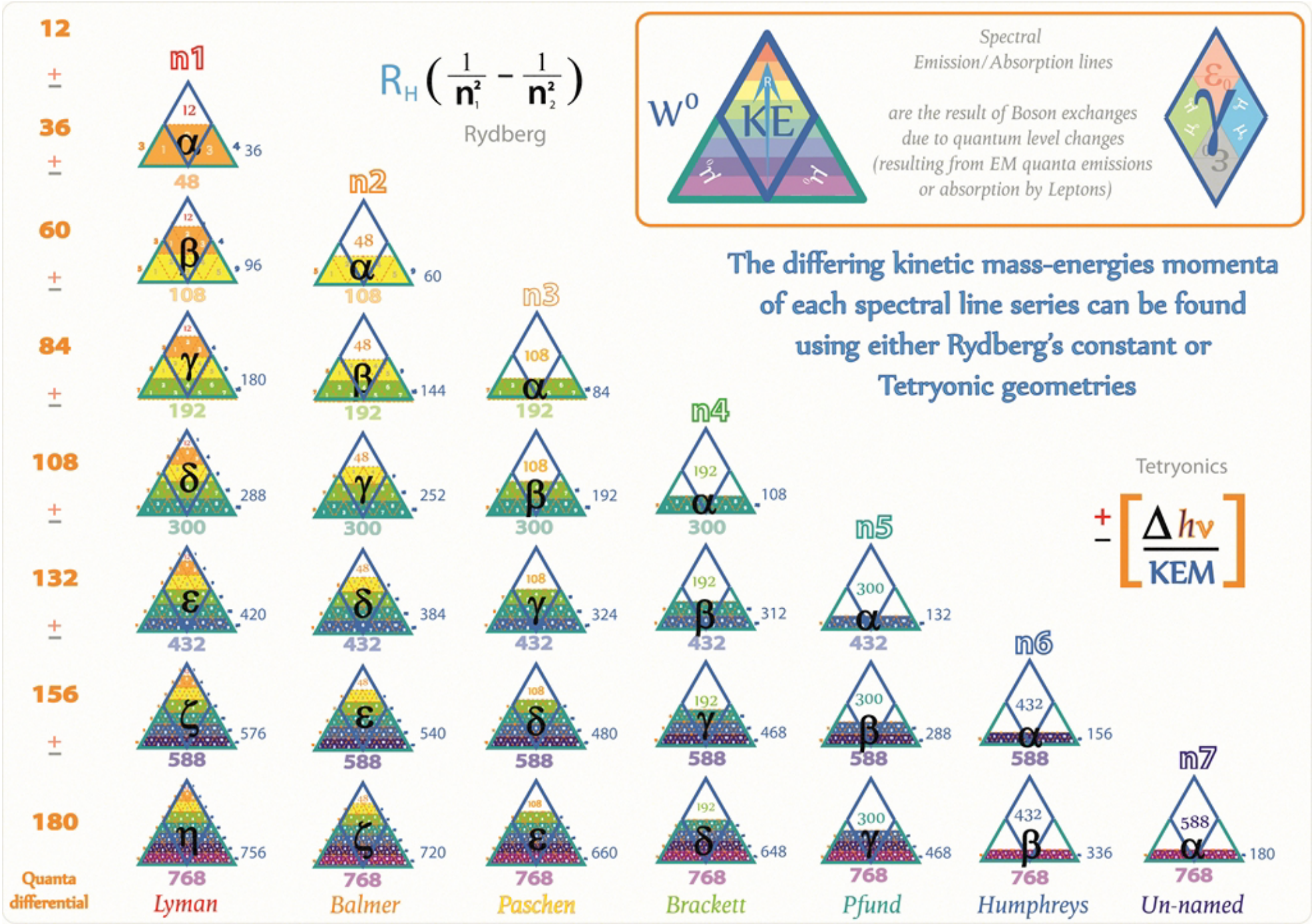
The calculation of the quanta required is historically done utilising Rydberg's Constant and its associated formula

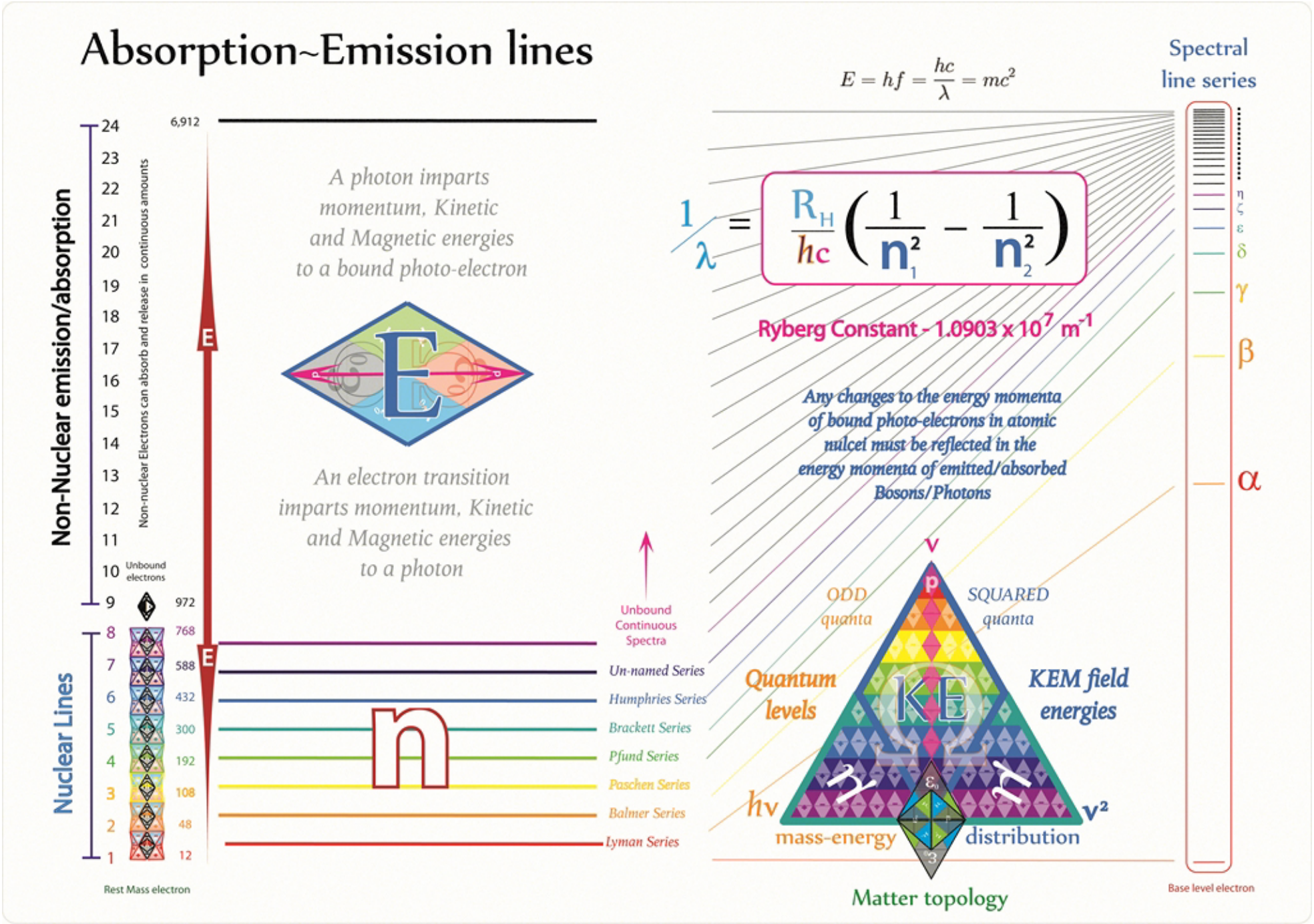
The quantum level [boson] differential equates it to the release or absorption of consecutive ODD number Planck quanta from squared KEM field energy geometries Δ[hv]



Rydberg's constant is a LINEAR measurement of wavenumbers which can be related to squared KEM energies through the velocity-frequency-wavelength relationship

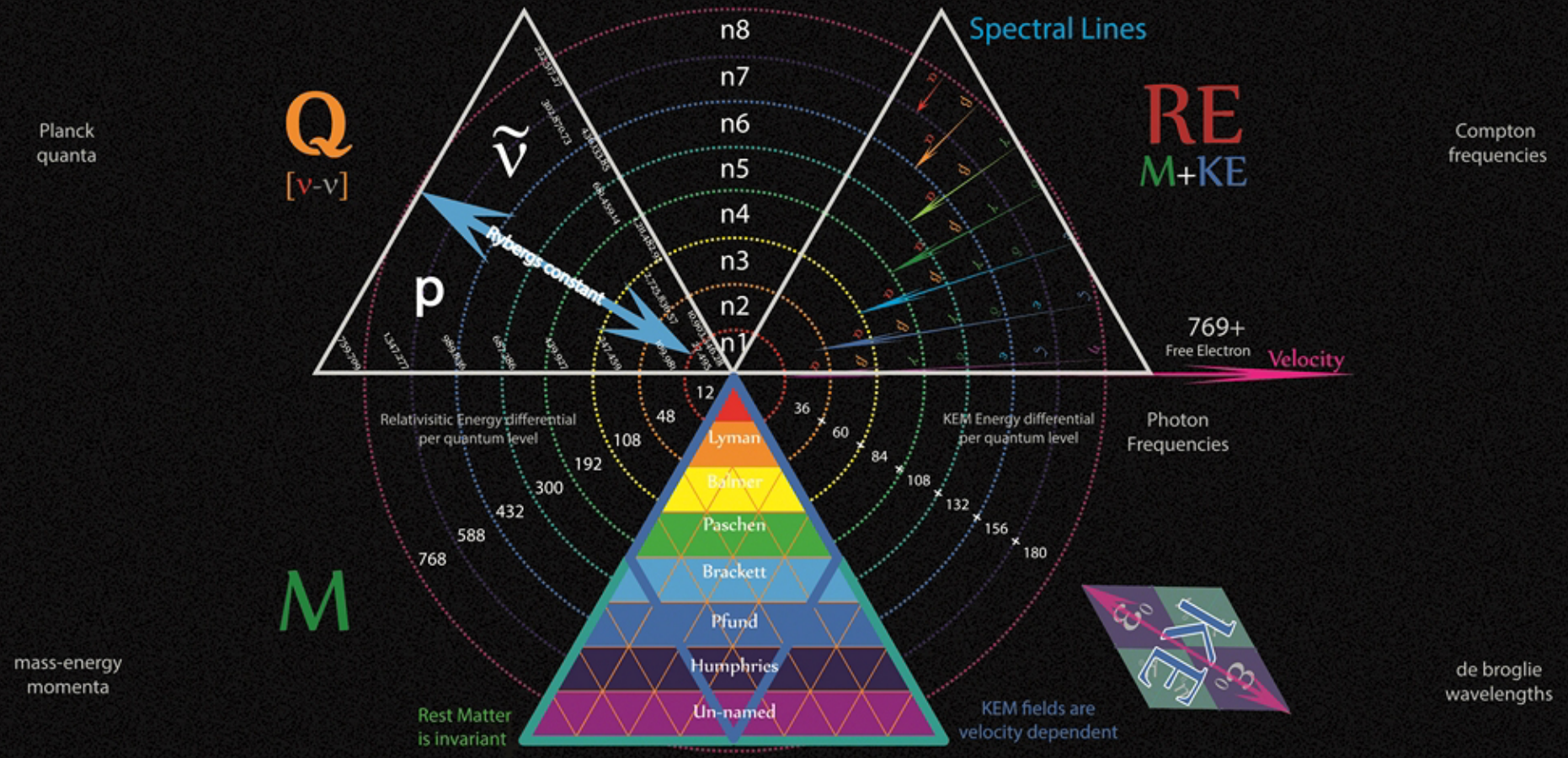






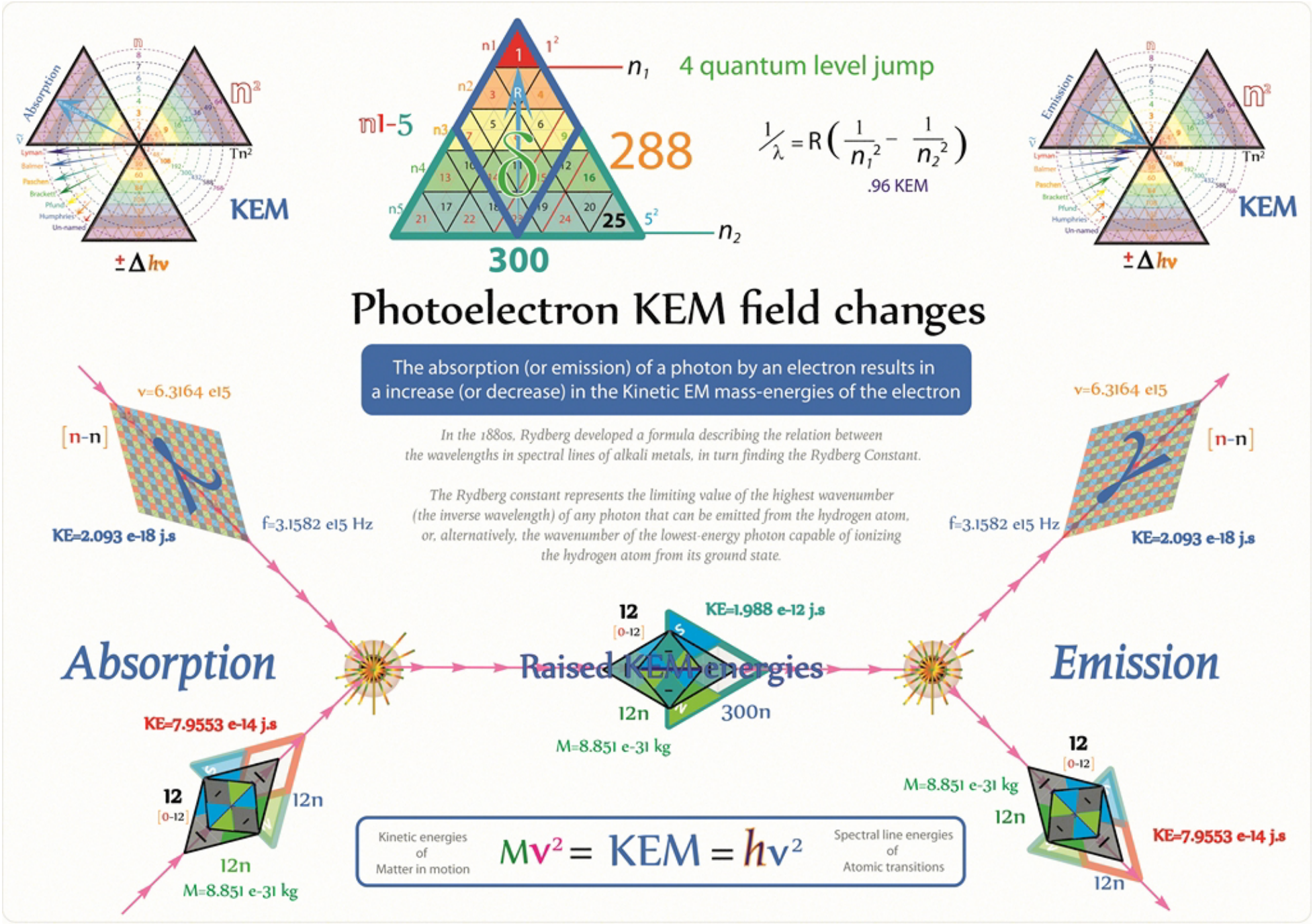
Spectral Lines

Spectral lines are the result of interaction between a quantum system (usually atoms, but sometimes molecules or atomic nuclei) and a single photon.
When a photon has exactly the right amount of energy to allow a change in the energy state of the system (in the case of an atom this is usually an electron changing orbitals),
the photon is absorbed. Then it will be spontaneously re-emitted, either in the same frequency as the original or in a cascade, where the sum of the energies of the photons emitted will be
equal to the energy of the one absorbed (assuming the system returns to its original state). The direction and polarization of the new photons will, in general, correlate with those of the original photon.



Spectral lines are highly atom-specific, and can be used to identify the chemical composition of any medium capable of letting light pass through it (typically gas is used).
Several elements were discovered by spectroscopic means, such as Helium [04], Rubidum [37], Cerium [58] and Thallium [81]

Spectral lines also depend on the physical conditions of the gas, so they are widely used to determine the chemical composition of stars
and other celestial bodies that cannot be analyzed by other means, as well as many other of their physical properties.



Revealing Rydberg Formula's geometry

The Rydberg formula is used in atomic physics to determine the wavenumber of spectral lines of many chemical elements.

$$\frac{h}{Mv} = \lambda$$

Wavelength is inversely related to Frequency

$$\frac{1}{\lambda} = \frac{R_H}{hc}\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

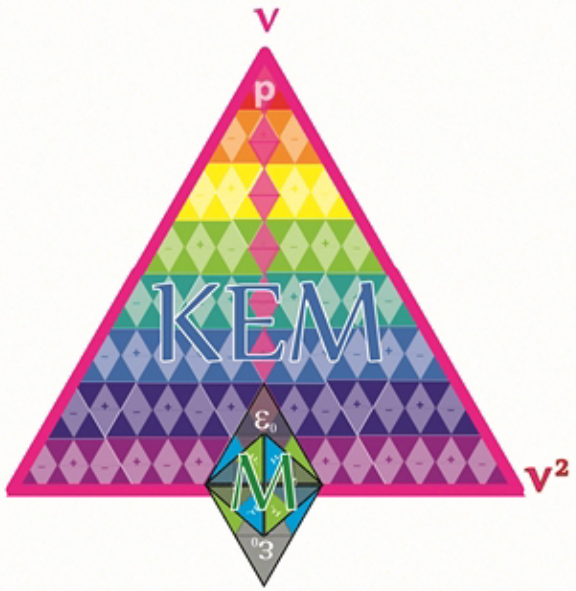
$$p/h = \tilde{\nu}$$

Wavenumbers are a inverse measure of Wavelengths

$$p^2 = E = Mv^2$$

Tetryonic geometry can be applied to Kinetic EM field variations produced by the emission and absorption of Photons by electrons in Nuclear orbits to reveal the geometry behind Rydberg's formula

$$p = \frac{E}{v} = hv$$



Compton frequency

$$\frac{Mv^2}{h} = f$$

EM Field — Planck quanta

$$12\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

Photoelectron KEM fields — ElectroMagnetic — mass — velocity

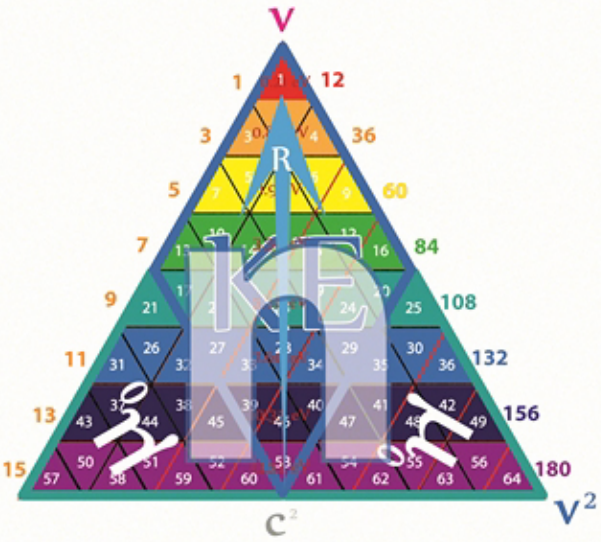
13.525 eV

$$Mv = \frac{KEM}{v} = hv$$

linear momentum — *longitudinal quanta*

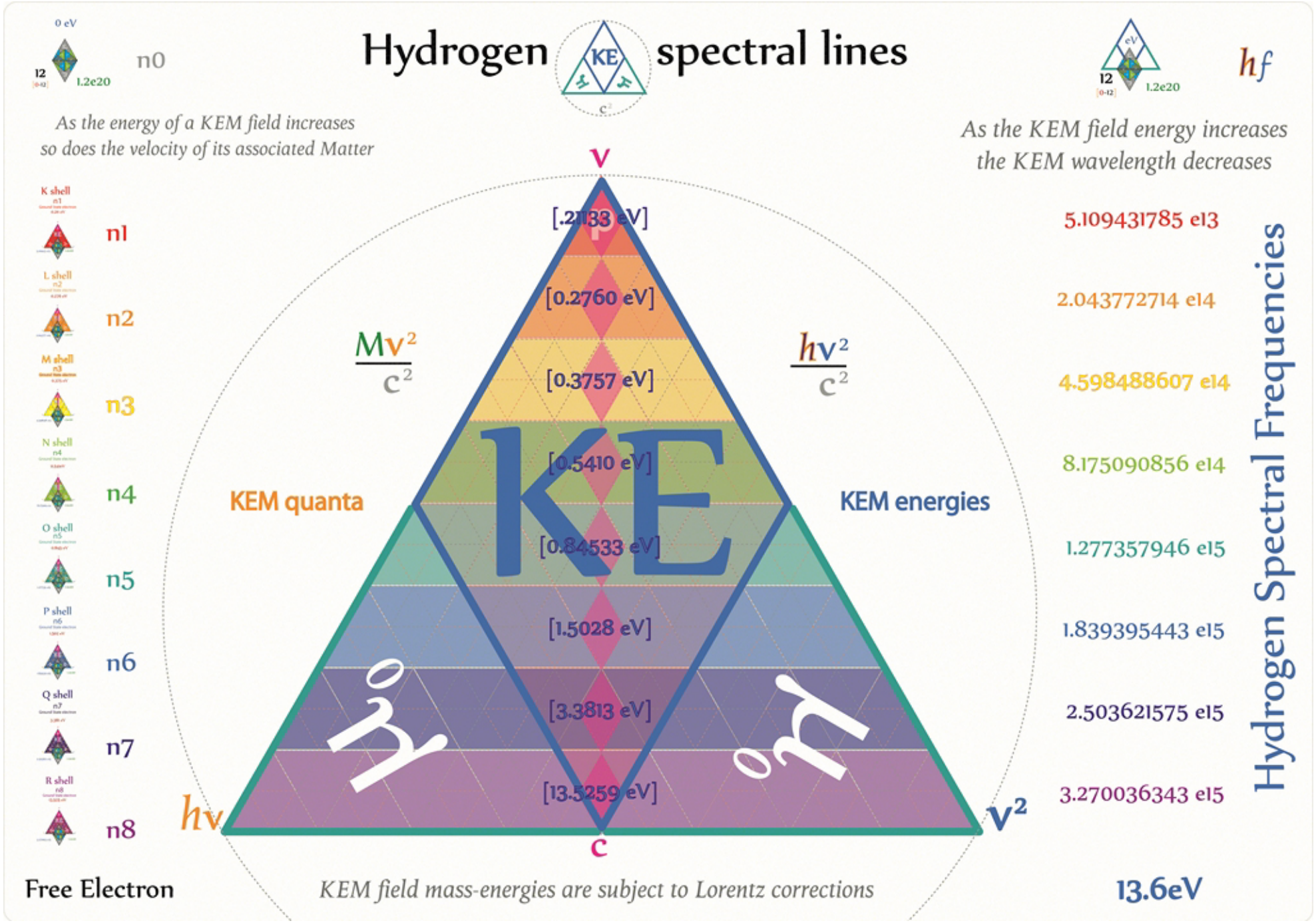
Spectral line emissions reveals Rydberg's formula to be a measure of longitudinal KEM momenta

$$KEM = hcR$$



Wavelengths and Frequency are related through the velocity of propagation

$$\lambda_{KEM} = \frac{f}{v}$$



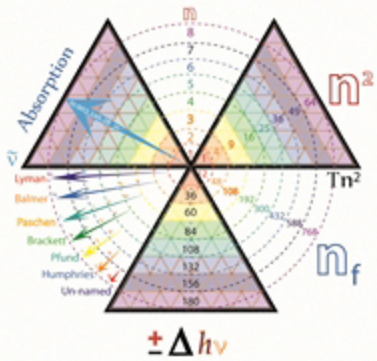
Absorption lines

Increase in photo-electronic energies

$$\Delta 2h\nu = E = hf$$

When an electron 'absorbs' a photon of energy momenta it 'jumps' from one energy level to another, dependent on the energy and frequency of the incident photon

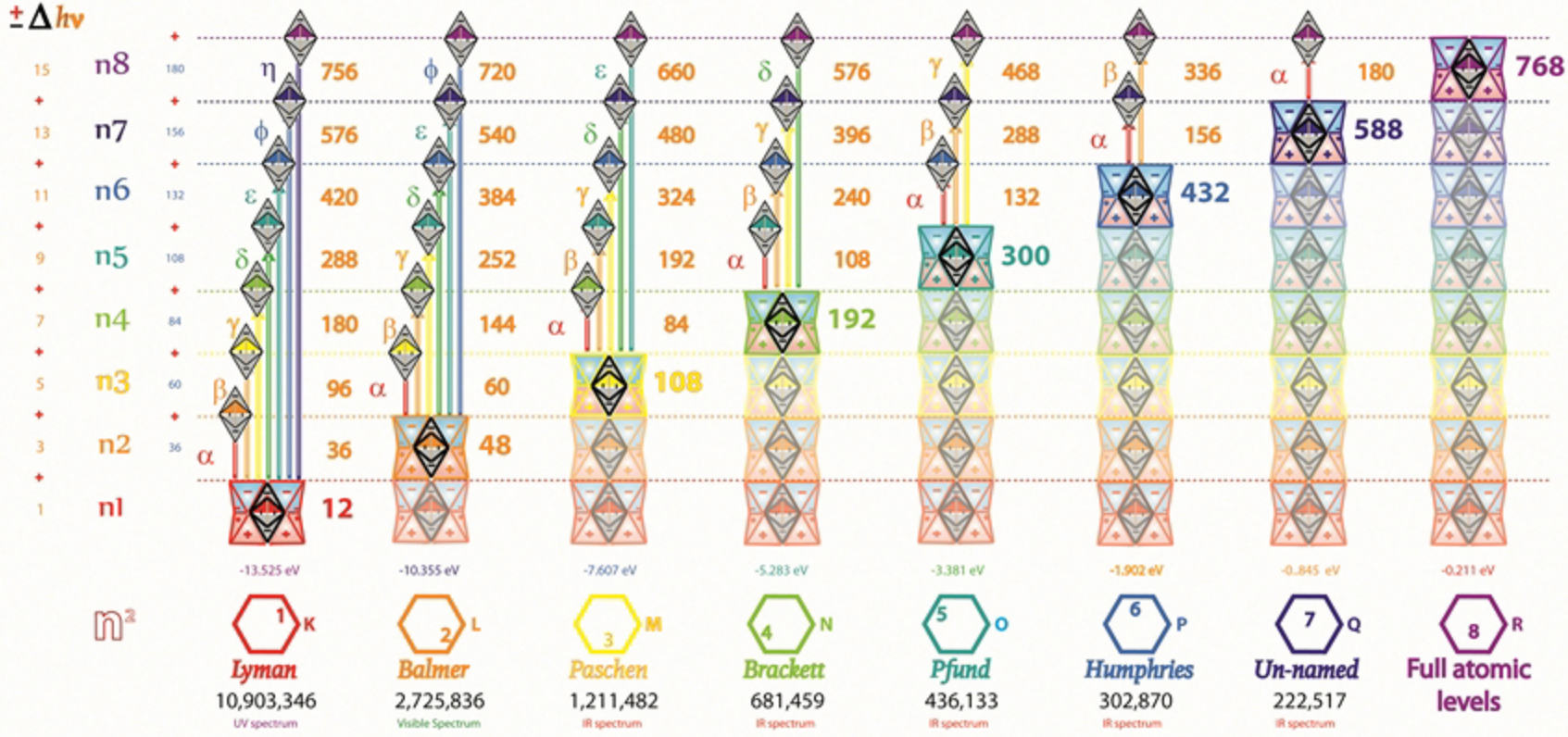
$$f = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$



The quantum level of the nuclei determines the ground quantum level of electrons within the nucleus
All transitions within the nulceus are discrete quantum jumps - outside the nucleus all spectra are continuous

KEM A Hydrogen photo-electron can only exist in specific energy levels below 13.525eV within the nucleus (any excess KE results in a unbound electron with KE - velocity)

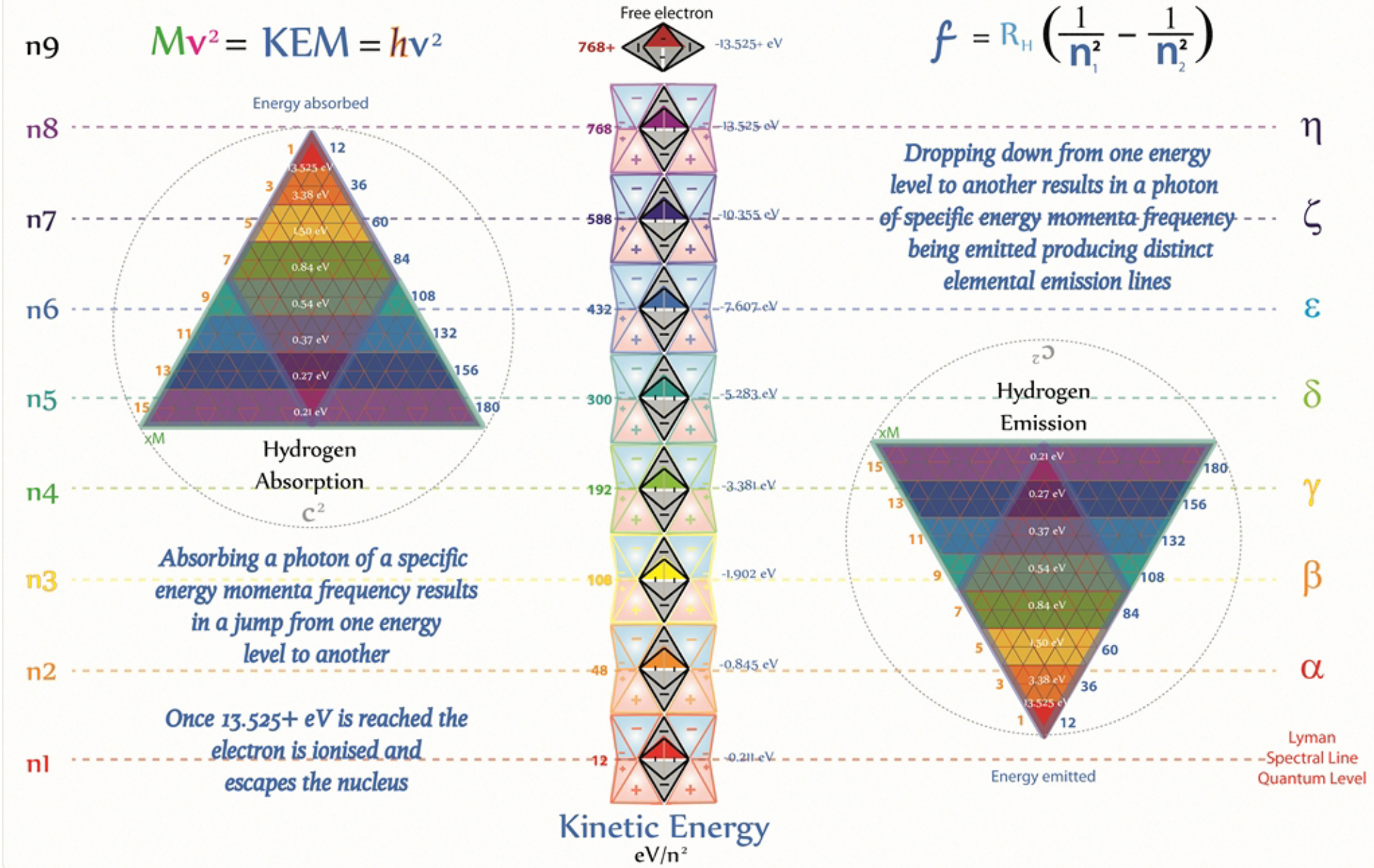
KE in excess of 13.525 eV results in unbound electron



KEM fields & quantum jumps

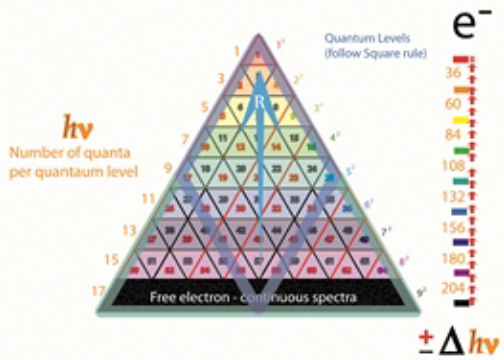
$Mv^2 = KEM = hv^2$

$f = R_H \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$



Emission lines

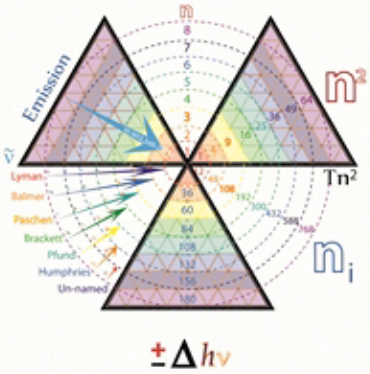
Decrease in photo-electronic energies



$$\Delta 2h\nu = E = hf$$

When an electron 'emits' a photon of energy momenta it 'drops' from one energy level to another dependent on the energy and frequency of the ejected photon

$$f = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

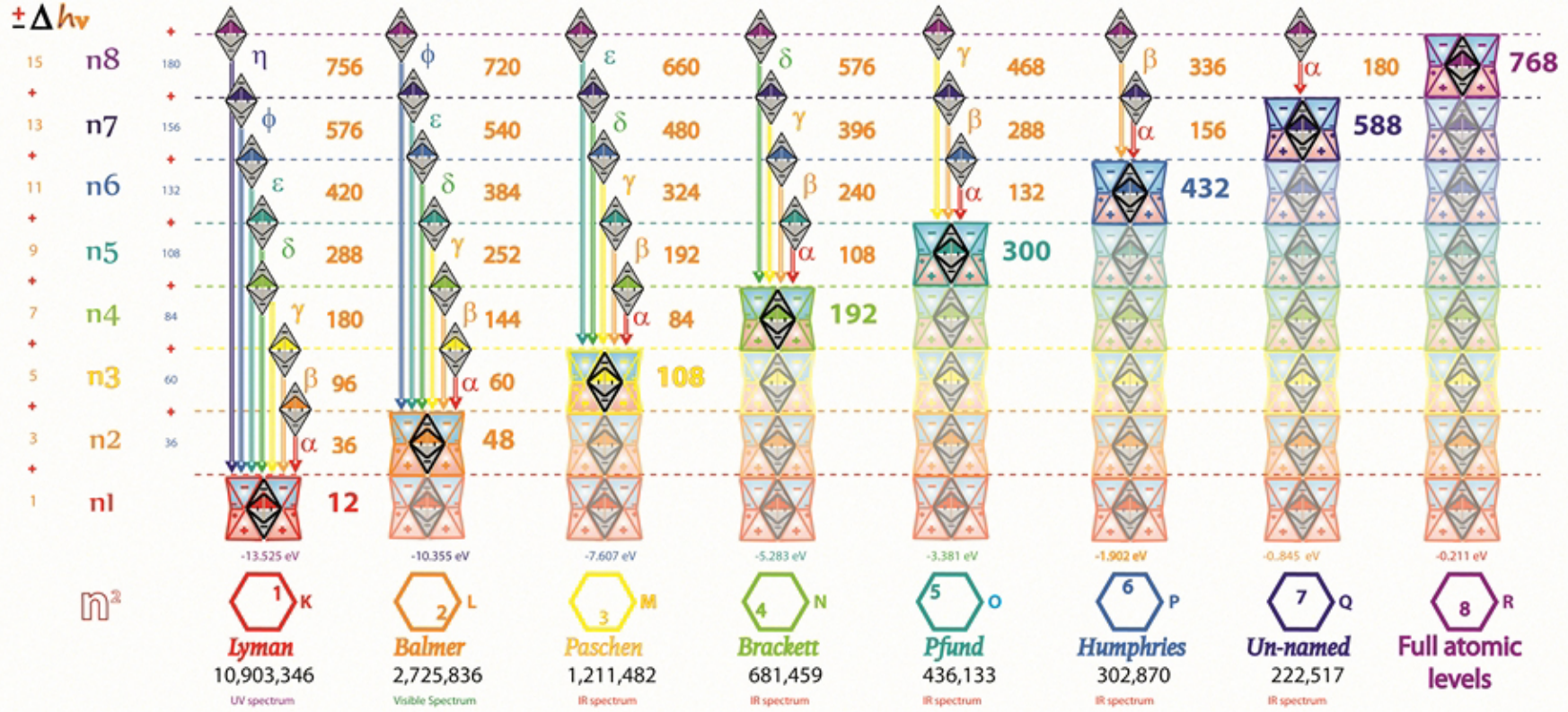


The quantum level of the nuclei determines the ground quantum level of electrons within the nucleus
All transitions within the nulceus are discrete quantum jumps - outside the nucleus all spectra are continuous

KEM

A Hydrogen electron can only exist in specific energy levels below 13.525eV within the nucleus (any excess KE must be shed as Photons)

KE in excess of 13.525 eV results in unbound electron



Spectral line series

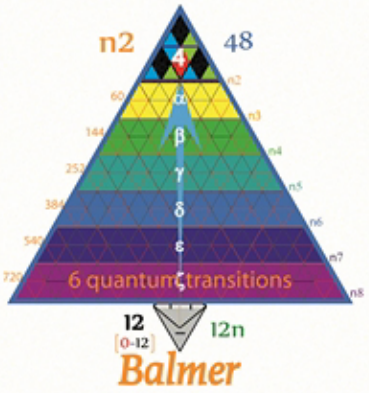
(are produced by changes in linear momentum in photo-electric KEM fields due to atomic transitions of electrons between squared energy levels)

Lyman	27.49545417
Balmer	109.9818167
Paschen	247.4590875
Brackett	439.9272667
Pfund	687.3863542
Humphries	989.8363501
Un-named	1,347.277254

Square root of Energy required to transition nuclear quantum levels

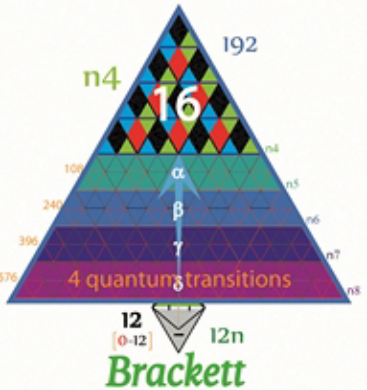
$$\left[\sqrt{756}\right].n^2$$

n1-8

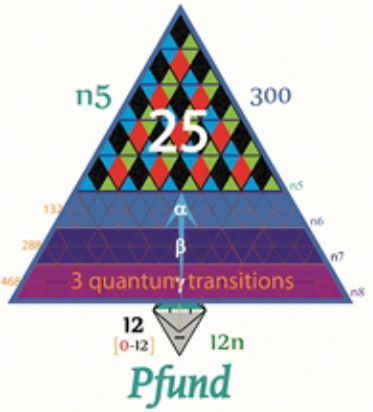


n2-8

n3-8



n4-8



n5-8

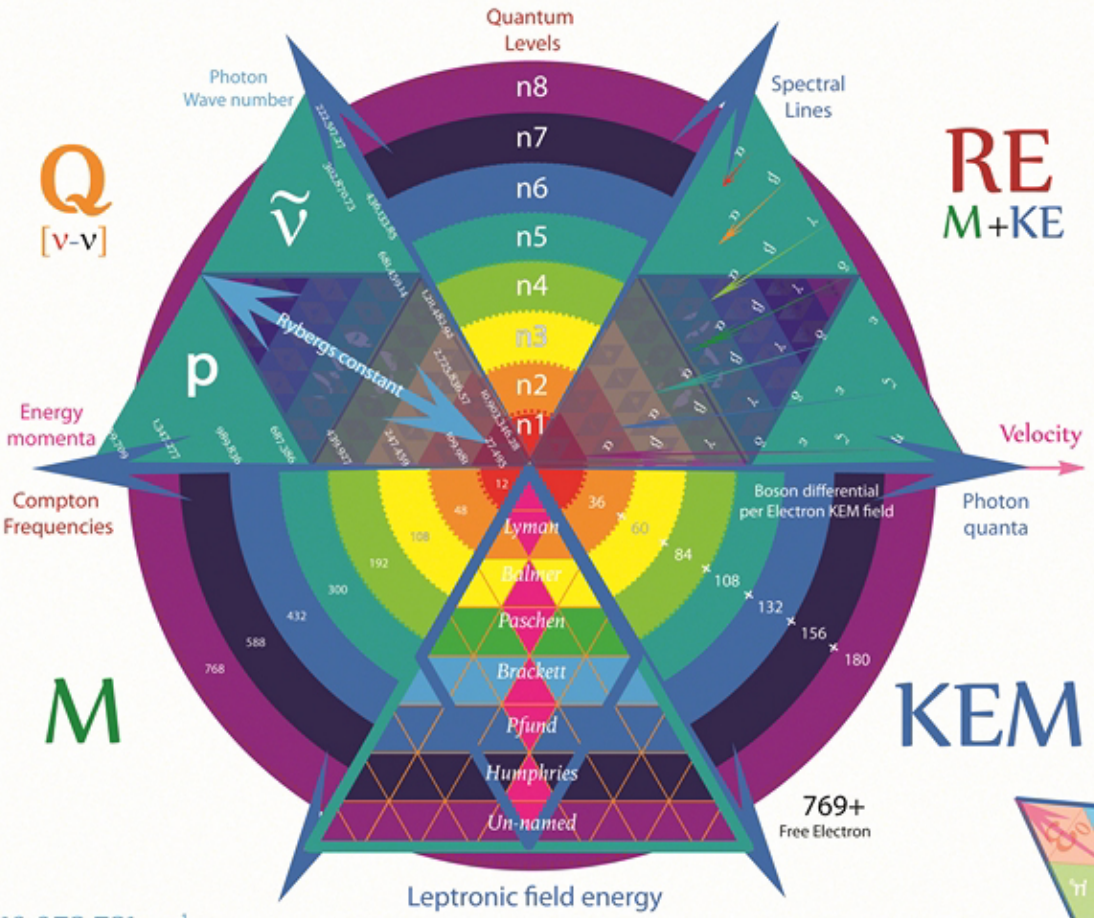
n6-8

n7-8

Rydberg's Constant

Johannes Robert Rydberg

(November 8, 1854 – December 28, 1919)



$$Q \quad [\nu\text{-}\nu] \qquad \tilde{\nu}$$

$$p$$

$$RE \quad M+KE$$

$$\tilde{\nu} = \frac{c}{27.49545} \qquad f = \frac{c^2}{27.49545} \qquad \lambda = \frac{27.49545}{c} \qquad p = 27.49545$$

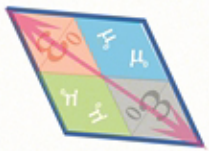
$$R_H = \frac{c}{27.49545}$$

$1.0903346.28 \times 10^7$ m-1

$$\lambda = v/f$$

Using the Tetryonic model of a photo-electron and its associated quantum KEM energy levels we see that Rydberg's constant is a linear measure of the photo-electronic KEM field - and in turn directly related to its scalar energy-momenta through 'c'

$$R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) \qquad M \qquad KEM$$



Currently accepted value - 10,973,731 m-1

Rydberg's Constant can be shown to be the square root of the total number of quanta required to transition a n1 electron to n8
(the highest quantum level possible in elemental nuclei)
as per Planck's heat law

Tetryonic theory value - 10,903,346 m-1

$$p^2 = KEM = Mv^2$$

Quantum Jump

The energy momenta of emitted photons is a function of the photo-electron's KEM wavefunction

27.49545

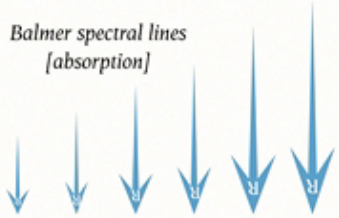
$$KE \quad \text{Photons}$$

$$Mv^2 = KEM = hcR_H$$

Wavenumbers and Planck's Law

Wavenumbers are revealed to be the number of quanta [nhv] required for a photo-electron to transition between specific quantum levels divided by the speed of light [c]

Balmer spectral lines [absorption]



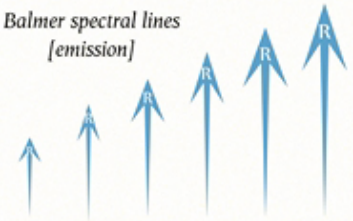
$$E = n[h\nu]$$

Wavenumbers are the number of Planck quanta required to reach a specific energy level

Max Karl Ernst Ludwig Planck

[April 23, 1858 – October 4, 1947]

Balmer spectral lines [emission]



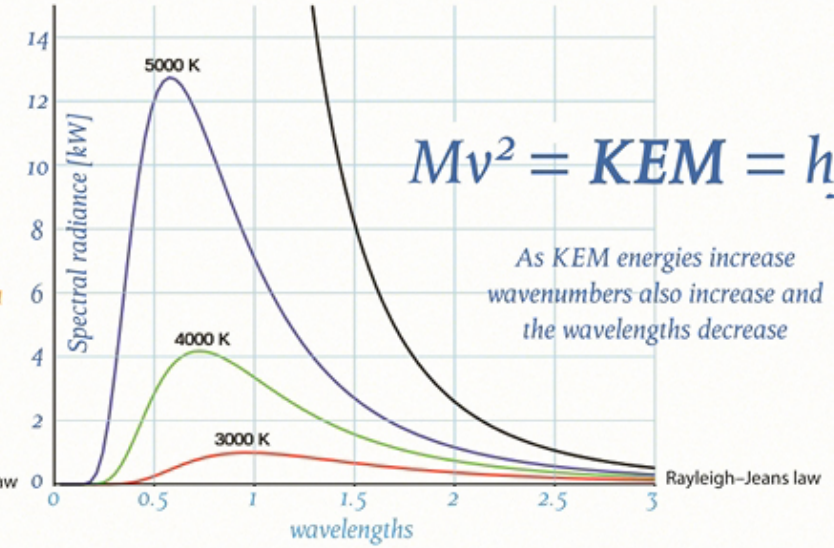
$$E = hc\tilde{\nu}$$

Photo-electrons emit and absorb photons to create blackbody radiation

Planck's law describes the electromagnetic radiation emitted by a black body in thermal equilibrium at a specific temperature

$$\Delta[nh\nu]$$

SQUARED energy levels have ODD numbered quanta in each energy level [bosons]

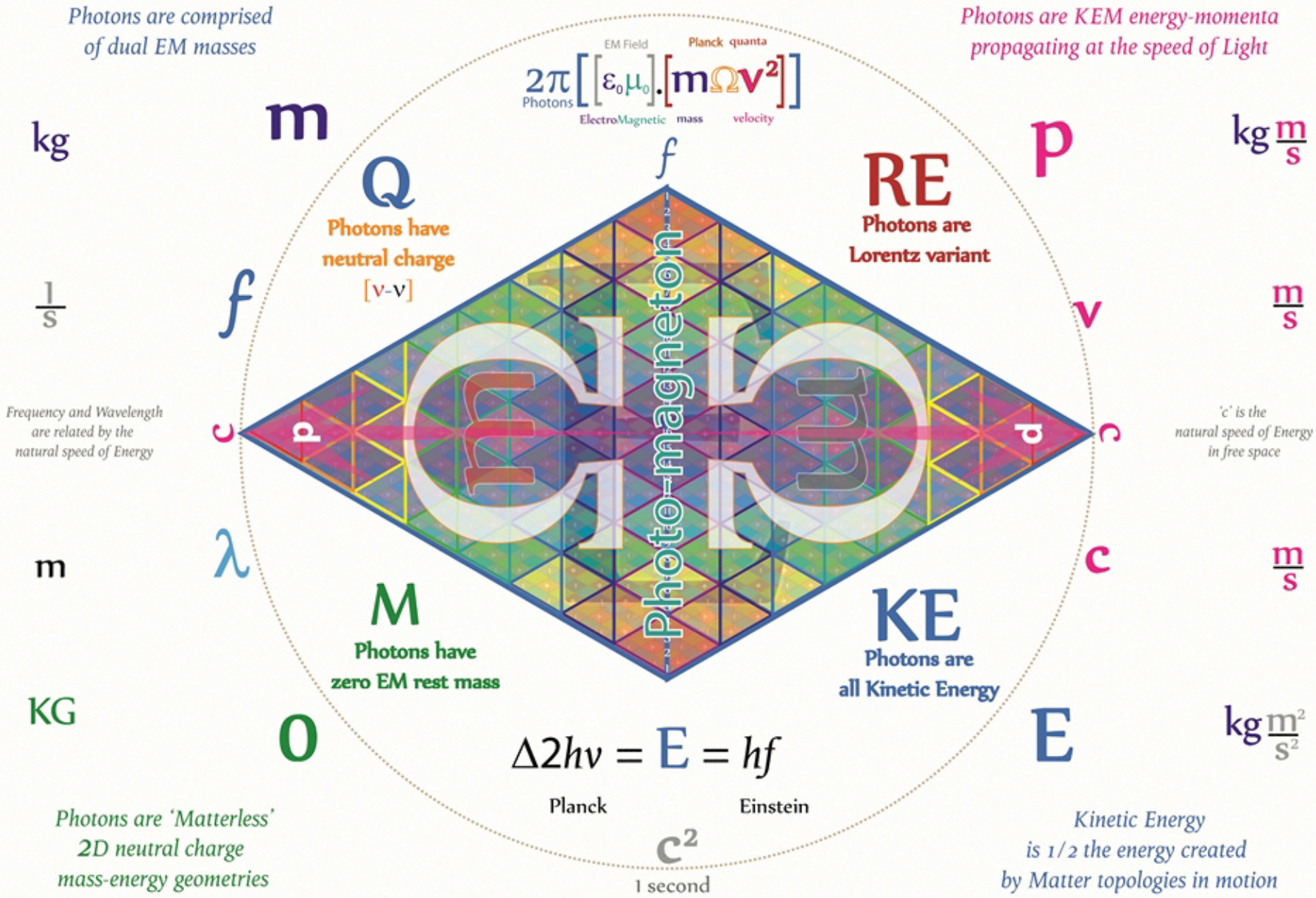


$$Mv^2 = KEM = hf$$

As KEM energies increase wavenumbers also increase and the wavelengths decrease

Spectral lines can be understood in quantum theory as differences between energy levels and proportional to wavenumber, frequency or wavelengths

Kinetic mass-energy momenta relationships



Relativistic Lorentz corrections

Hendrik Lorentz

(18 July 1853 – 4 February 1928)

$$\sqrt{1-\beta^2}$$

$$E=\frac{mc^2}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$\sqrt{1-\left(\frac{v}{c}\right)^2}$$

The Lorentz transformation was originally the result of attempts by Lorentz and others to explain how the speed of light was observed to be independent of the reference frame and later expanded upon in an attempt to understand the creation of emfs in magnets and symmetries in electromagnetic forces

Einstein inlcuded the transformation in his theory of Special relativity [SR].

The Lorentz transformation supersedes the Galilean transformation of Newtonian physics, which assumes an absolute space and time.

According to special relativity, the Galilean transformation is a good approximation only at relative speeds much smaller than the speed of light.

Tetryonics expands upon all of this revealing this relationship as a result of the geometry of electromagnetic mass-energies in motion

rest mass-Matter — Energy

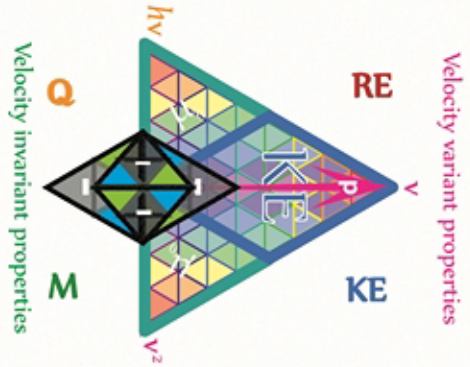
$$\frac{4n\pi}{c^4}\left[\left[m\Omega v^2\right]\right]$$

spatial co-ordinate system — Planck quanta — mass — velocity — momentum

Matter is EM energy propagating at the 'speed of Light' in a standing wave energy topology

One of the greatest mistakes in relativistic mechanics is the application of Lorentz corrections to Matter.

It stems from there being no definition and enforced differentiation between EM mass and Matter



$$m = \frac{E}{c^2}$$

2D planar fields are relativisitic

radiant EM mass geometry

$$\frac{m}{c^2} = M$$

standing-wave Matter topology

3D standing-waves are velocity invariant

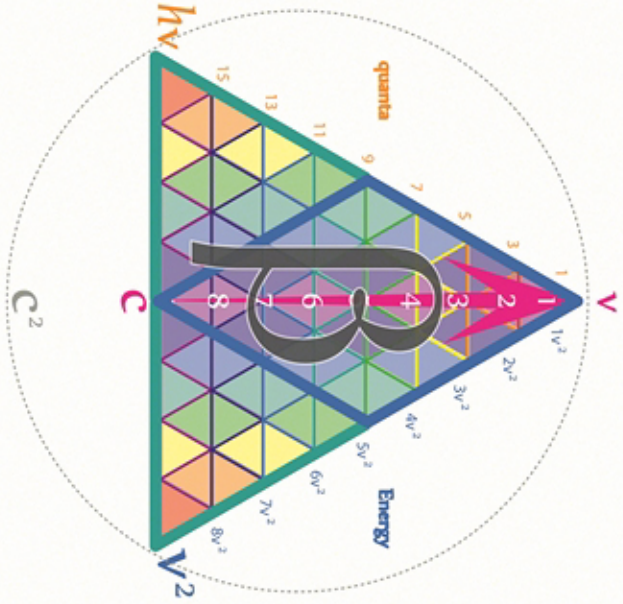
$$\frac{E}{c^4} = M$$

mass is a property of Matter - Matter is not a property of mass [they are directly related throught the velocity of light]

$$\beta = \left[\frac{v}{c}\right]$$

velocity is a result of vector forces

All 2D energy waveforms propagate at the 'speed of Light'



$$\beta^2 = \left[\frac{v^2}{c^2}\right]$$

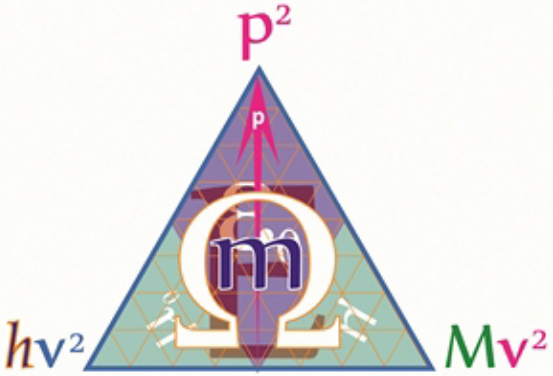
The Kinetic Energy of Matter in motion is directly related to the square of the velocity

$$\gamma \equiv \frac{c}{\sqrt{c^2 - v^2}} = \frac{1}{\sqrt{1 - \beta^2}} = \frac{dt}{d\tau}$$

The 'speed of Light' is a EM constant and is the limiting velocity achelvable by the electrical acceleration of Matter

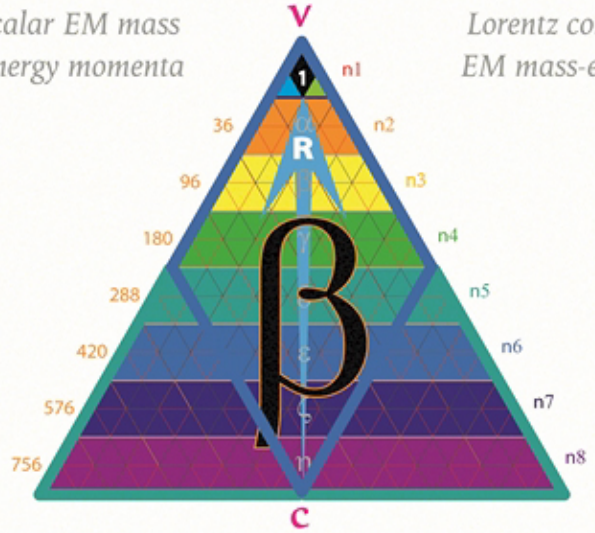
Spectral Energy relationships

$$kg\,\frac{m^2}{s^2} \quad E = p^2$$

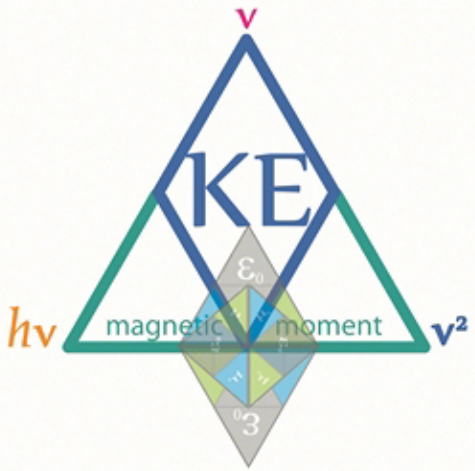


Scalar EM mass -energy momenta

Lorentz corrected EM mass-energies



$$KEM = \frac{m\nu^2}{c^2}$$



$$M\nu^2 = KEM = hcR_H$$

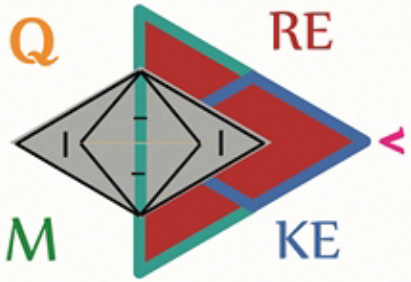
13.525 eV

All Spectral line emissions and absorptions produce changes in KEM energies, Angular momentum, Linear momentum, Frequency and Wavelengths

Linear

$$\left[\frac{\Omega}{c}\right] = \lambda$$

de Broglie wavelengths



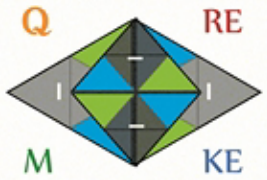
The 'speed of Light' is the maximum velocity acheivable by electrical energies

Scalar

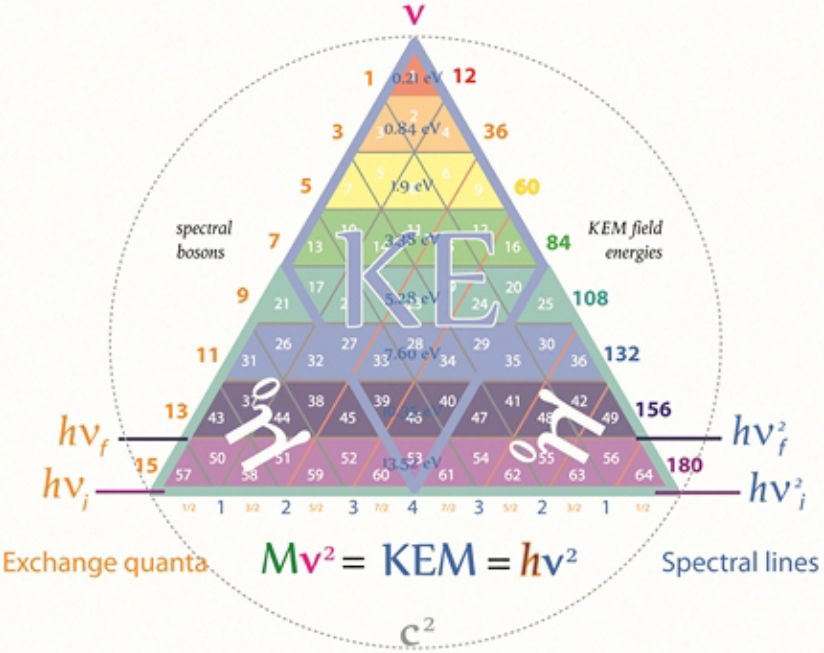
$$f = \left[\frac{c^2}{\Omega}\right]$$

Compton frequencies

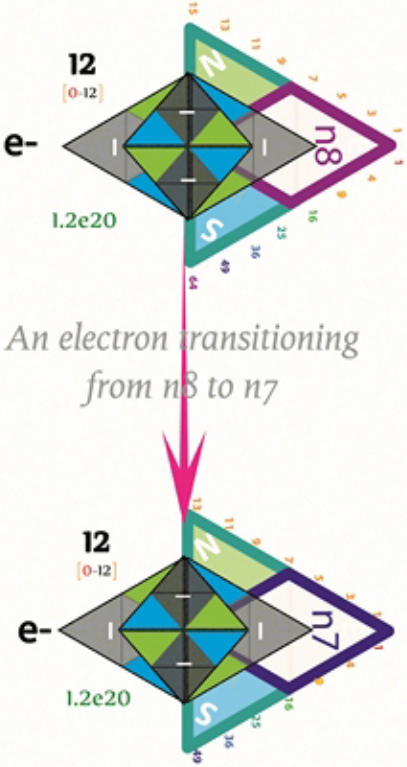
Spectral line photon production



At no time does the 3D rest Matter-energy content of the electron change



Does so by emitting Kinetic Energy quanta



An electron transitioning from n8 to n7

λ	19,174.54158	nm
$\tilde{\nu}$	52,152.48541	m-1
f	1.563492179 x 10^{13}	Hz
E	0.064693658	eV
Ω	5,748.382952	m^2/s

Which are released as photons of specific energy-momenta

As the 3D rest Matter of any particle in motion is Lorentz invariant any changes in velocity-momentum produces changes to the mass-energy momenta content of the 2D KEM field [boson changes are the difference of two squares]

$$E = hf$$

Spectral line wavenumbers

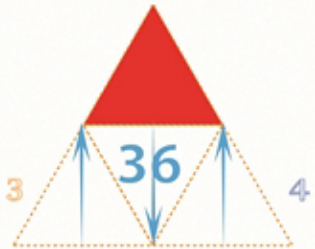
Tetryonic $\left(\frac{15 \diagup 49}{64}\right)$ .0047 $\quad \frac{1}{\lambda} \quad$ Rydberg $R\left(\frac{1}{49} - \frac{1}{64}\right)$ .0047

of specific wavelengths (Spectral Lines)

Wavenumbers

are the number of energy momenta wavelengths per unit distance

n1 2

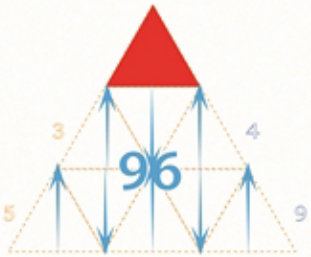


48

1 quantum level jump

α

n1 3

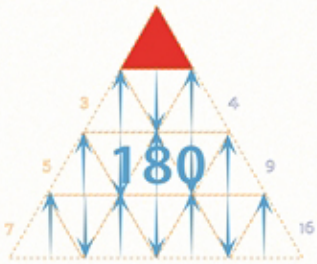


108

2 quantum level jump

β

n1 4



192

3 quantum level jump

γ

$\tilde{\nu}$

the wavenumber (also wave number) is the spatial frequency of a wave, either in quanta per distance or nπ radians per unit distance.
It can be envisaged as the number of specific wavesets that exist over a specified distance

$1/\lambda$

m^{-1}

n1 5

300

4 quantum level jump

δ

n1 6

432

5 quantum level jump

ε

n1 7

588

6 quantum level jump

ζ

n1 8

768

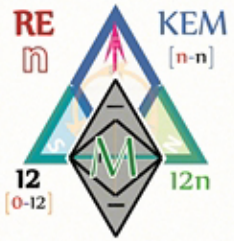
7 quantum level jump

η

For electromagnetic radiation in vacuum, wavenumber is proportional to frequency and to photon energy

Bosons, Photons and quantums of energy momenta

$\tilde{\nu}$ WAVENUMBERS $E = \Sigma h\nu$

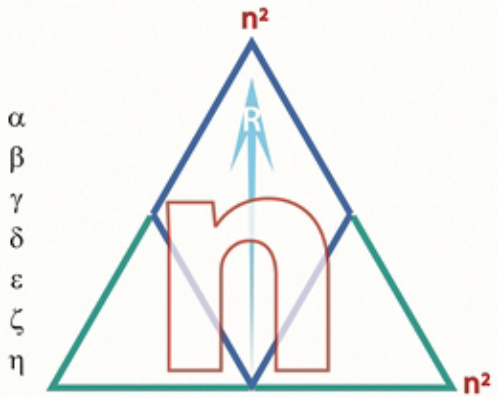


$KEM = Mv^2$ LINEAR MOMETNUM p

γ Spectral lines are produced $\Delta m\Omega v = \Delta mv = \Delta p$ by accelerating electrons a

equilateral energy momenta is the foundation of all quantum EM wave-functions

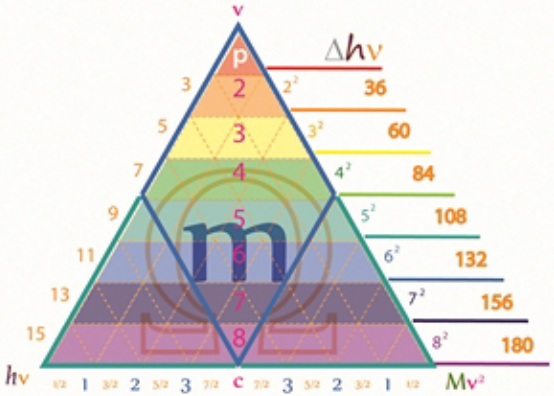
ODD distribution $2\nu = f$ **SQUARED distribution**



Spectral lines

Bosons

$h\nu$



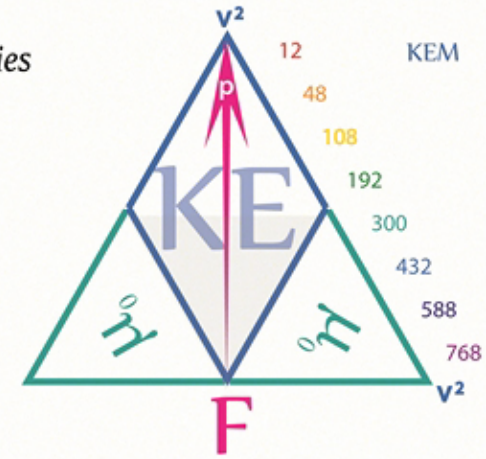
EVEN distribution

hf

Photons

Kinetic energies

$h\nu^2$



energy momenta

Spectral Energy - Planck relationships

$$\frac{E}{v^2} = \frac{m}{\Omega} = \frac{E}{c^2}$$

deBroglie wavelength λ

Planck quanta differential

spectral mass-energies

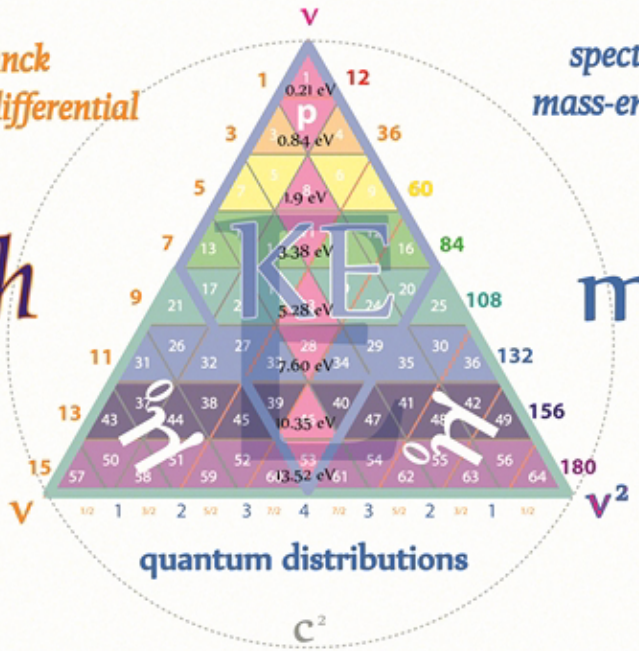
f Frequency

p MOMENTUM

h

m

ENERGY E



Wave number $\tilde{\nu}$

v^2 Compton Frequency

Applying mass to spectral energy relationships reveals the familiar quantum mechanical wave-particle relationships and properties

	2D waves					3D Matter	
EM wave wavelength	Ω / c	=	planck constant	h / p	linear momentum	=	$m\Omega / mc$	deBroglie wavelength
EM wavenumber	c / Ω	=	linear momentum	p / h	planck constant	=	$mc / m\Omega$	Matter waves
EM wave Frequency	c^2 / Ω	=	kinetic energy	E / h	planck constant	=	$mc^2 / m\Omega$	Compton Frequency

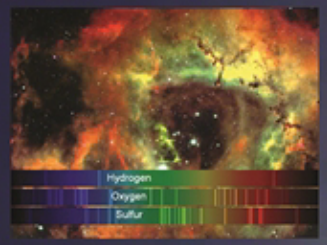
Thus reinforcing the geometric role of quantised angular momenta in Planck's constant

White Light

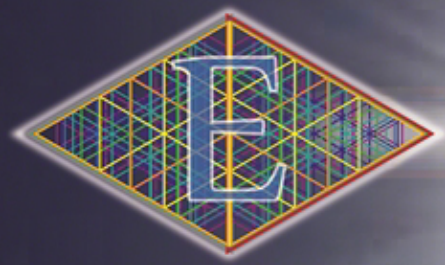
White light is radiated by our SUN and all the stars throughout the Universe.
In fact, most of the energy radiated by the sun is within the visible spectrum, which is most likely why we see this range.

Incandescence is the greatest known generator of white light. The verb incandesce means to glow white. This is also referred to as black-body radiation.

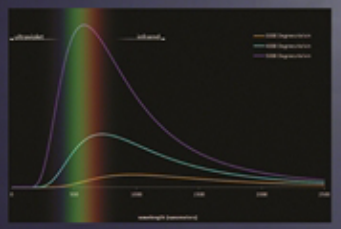
The color of a black body object at high temperatures causes it to glow, and the waves emitted include visible light.
In addition to the sun and common light bulb, molten materials such as metal or glass also glow incandescently.



Spectroscopy



Planck's Heat Law



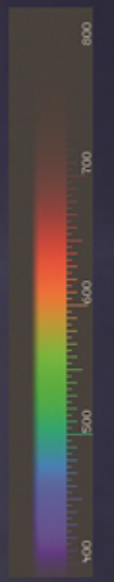
Most light sources are thermal, meaning the type of radiation they emit is a characteristic of the source's temperature.

White light can be decomposed or reconstituted by passing it through a Prism

[Spectroscopy]

White light is comprised of many photons of varying frequencies and wavelengths

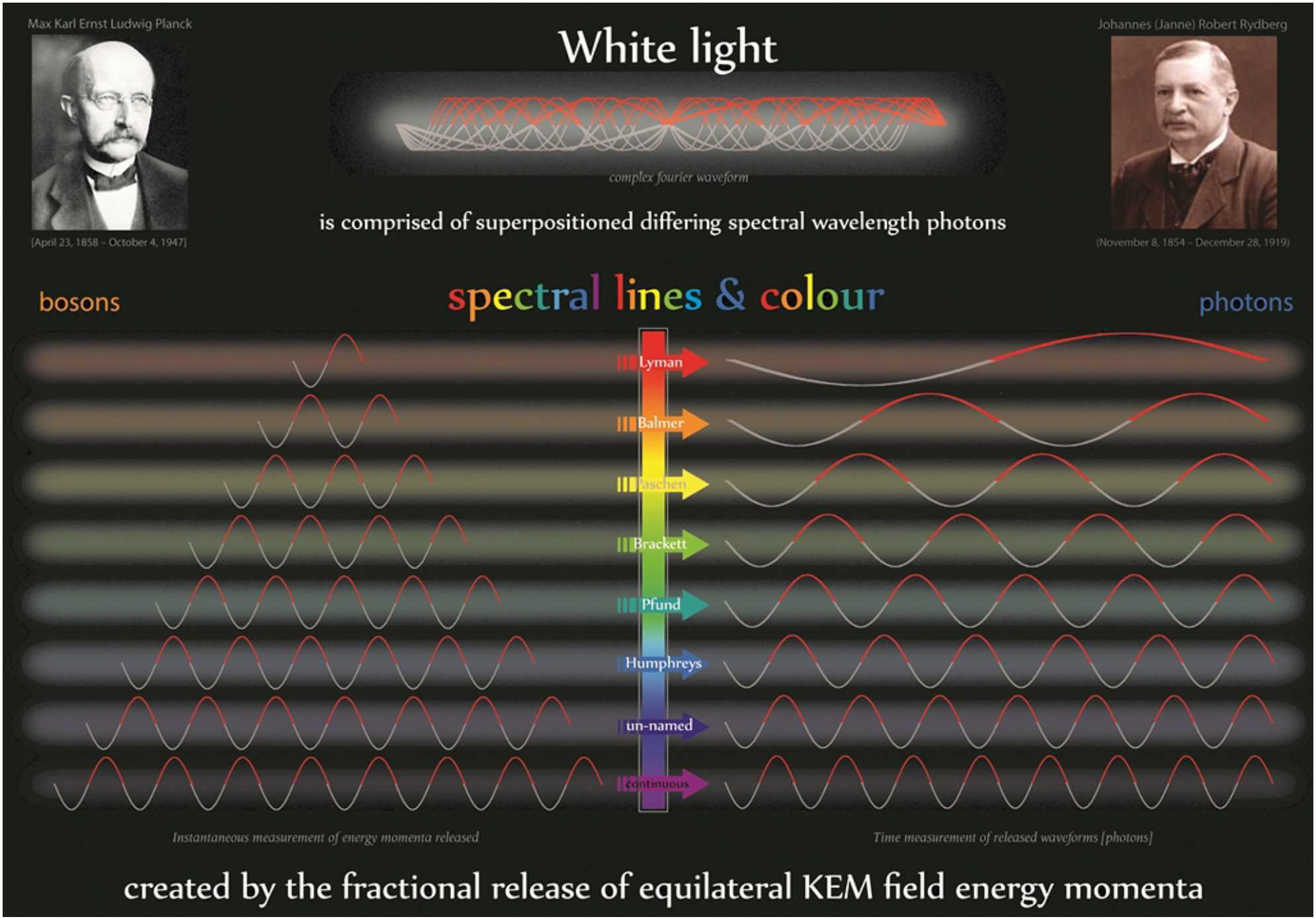
Each colour of light has a specific frequency and wavelength

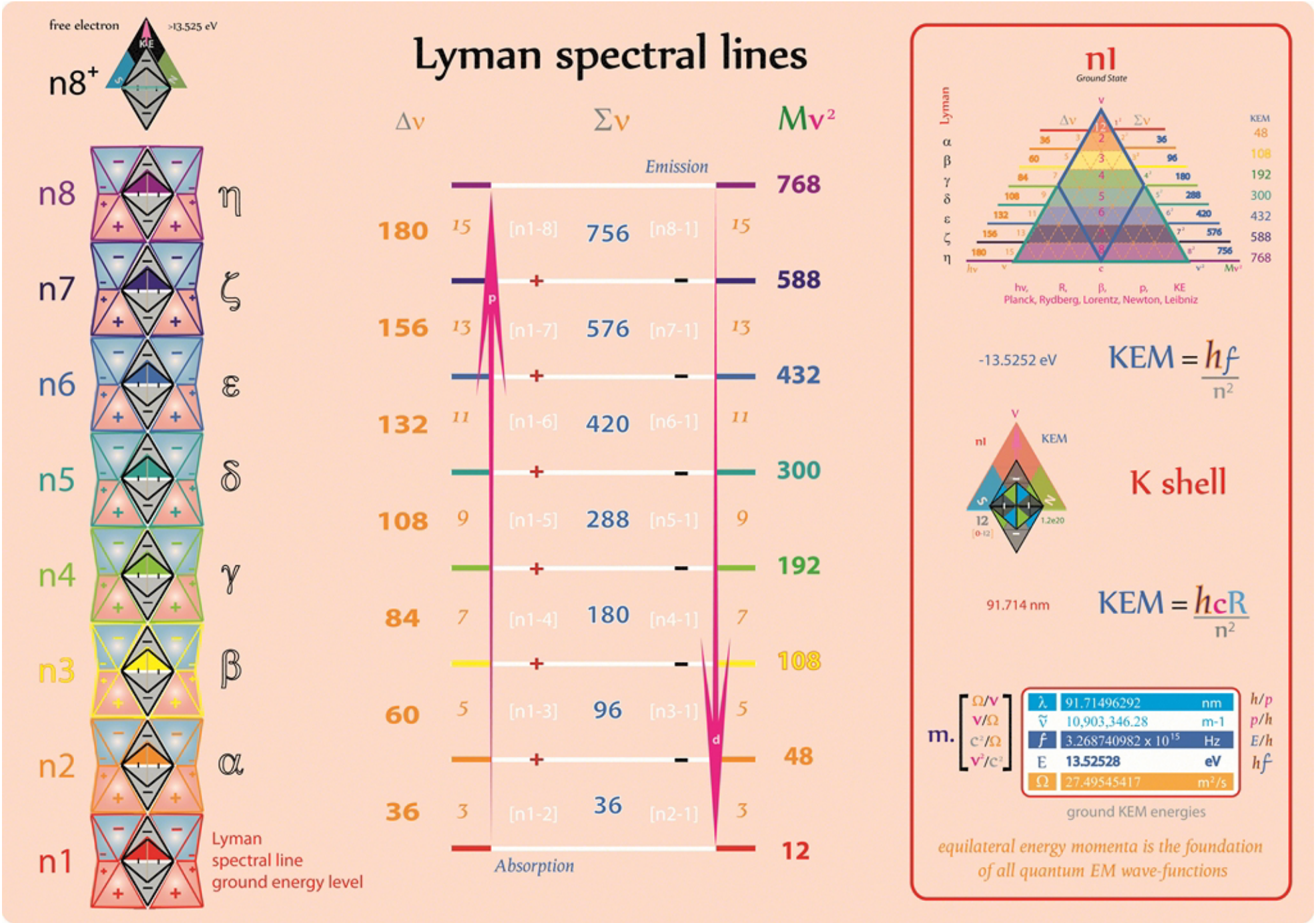


Microwaves
Visible Light
UV rays

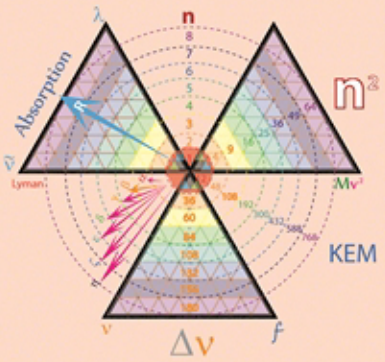
Until Newton's work proved otherwise, most scientists believed that white was the fundamental color of light; and that other colors were formed only by adding something to light. Newton demonstrated this was not true by passing white light through a prism, then through another prism. If the colors were added by the prism, the second prism should have added further colors to the single-colored beam. Since the single-colored beam remained a single color, Newton concluded that the prism merely separated the colors already present in the light.

White light is the result of superpositioning of the visible colors [varying frequencies] of EM waves





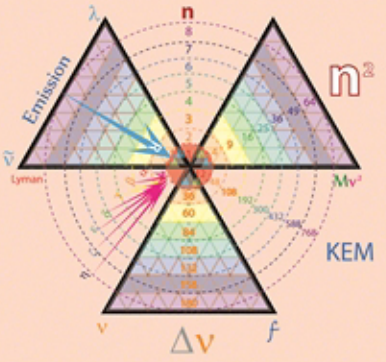
As photo-electrons transition between Mv squared KEM field energy levels in atomic nuclei they release specific [Δhν] W bosons



Lyman spectral series

α	122.28	n1-2
β	103.18	n1-3
γ	97.83	n1-4
δ	95.53	n1-5
ε	94.33	n1-6
ζ	93.62	n1-7
η	93.17	n1-8

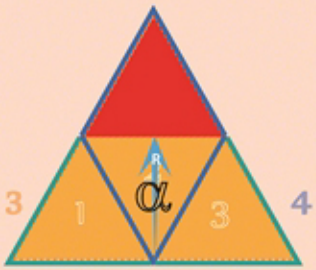
UV spectrum



K shell

$$\frac{\Delta\nu}{KEM}$$

n1~2



36

48

1 quantum level jump

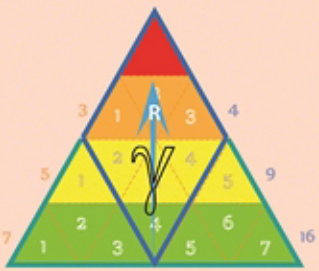
n1~3

96

108

2 quantum level jump

n1~4



180

192

3 quantum level jump

n1~5

288

300

4 quantum level jump

n1~6

420

432

5 quantum level jump

n1~7

576

588

6 quantum level jump

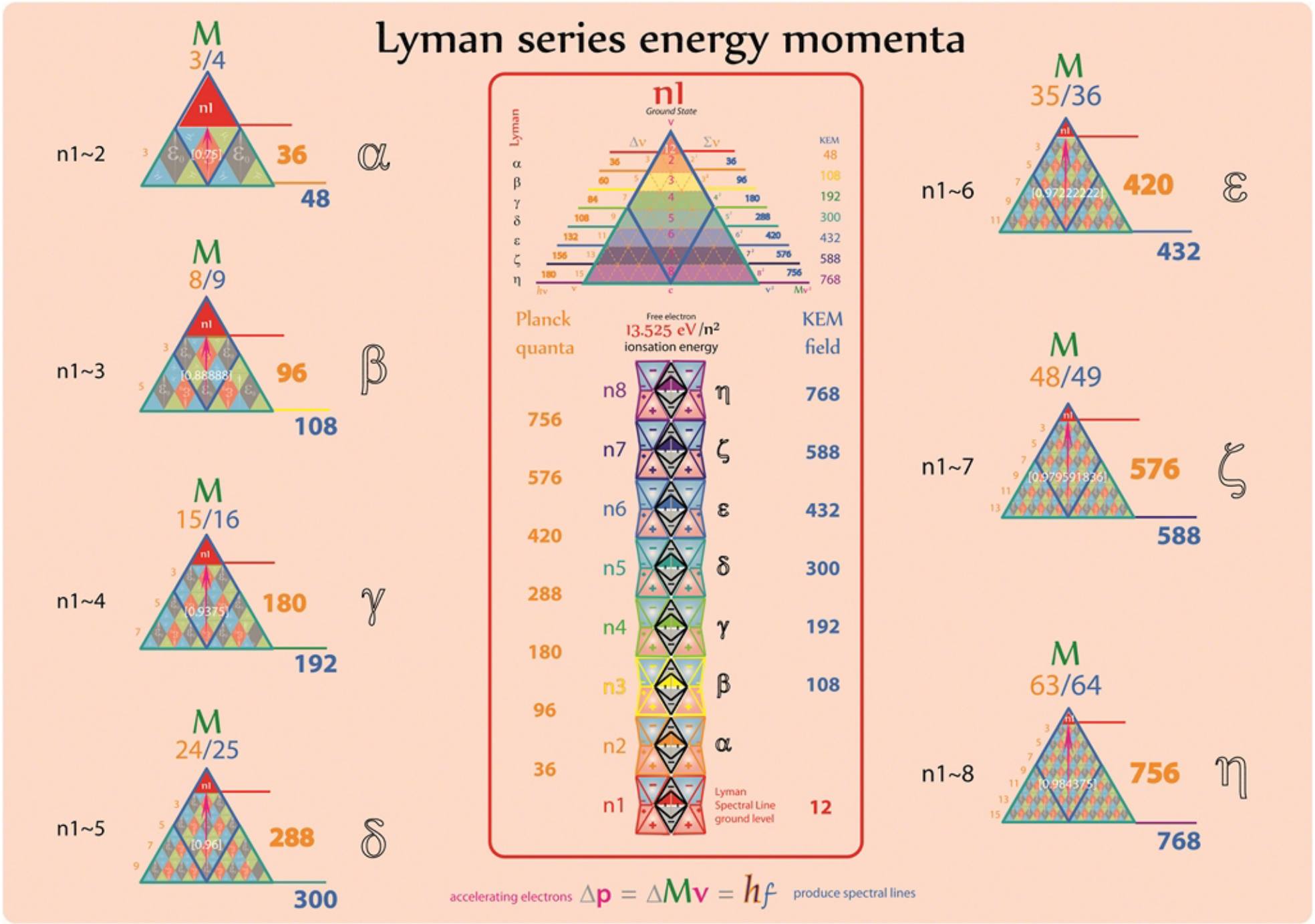
n1~8

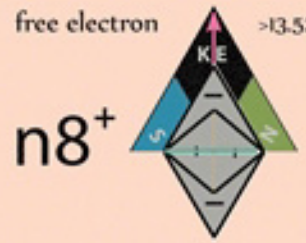
756

768

7 quantum level jump

Lyman series energy momenta

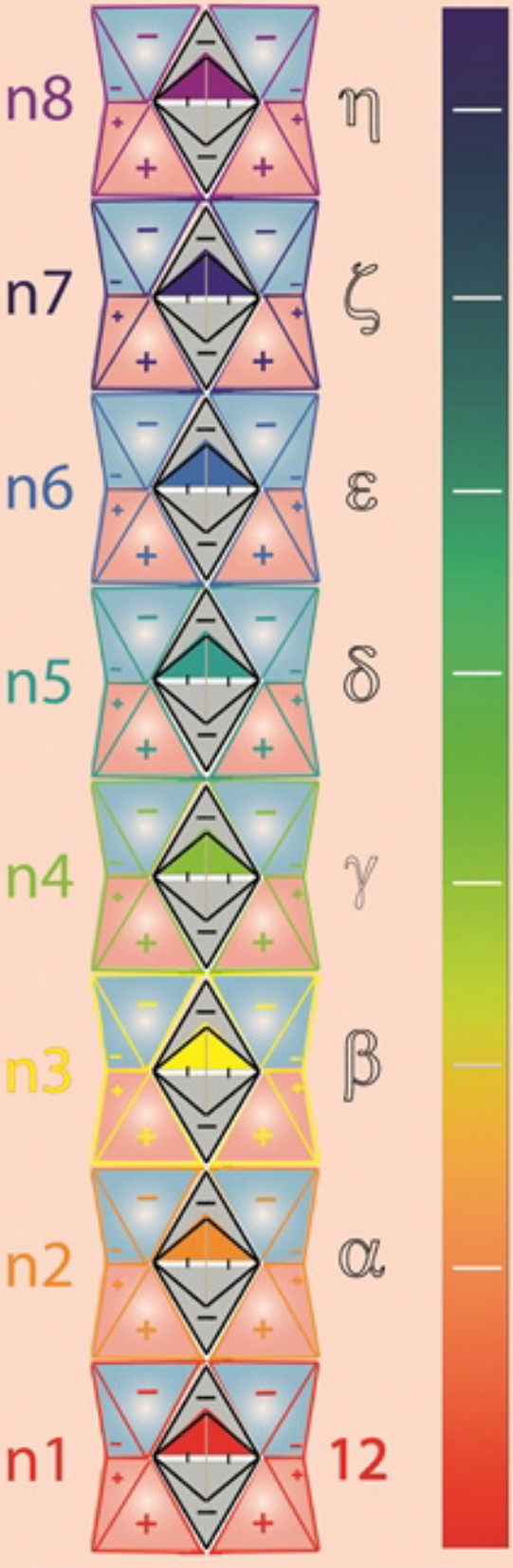




Lyman Series

$$\Delta h\nu \;=\; KEM \;=\; hcR$$

Tetryonic = 13.525 eV = Rydberg



63/64	.9843	93.17075598 nm; 10,732,981.5 m-1; 3.217666905 x 10^15 Hz; E 13.31395504 eV; Ω 27.93188995 m²/s	$R\left(\frac{1}{1}-\frac{1}{64}\right)$	.984375
48/49	.9795	93.62569132 nm; 10,680,829.01 m-1; 3.202031983 x 10^15 Hz; E 13.24926138 eV; Ω 28.06827613 m²/s	$R\left(\frac{1}{1}-\frac{1}{49}\right)$	.9795
35/36	.9722	94.33539043 nm; 10,600,475.55 m-1; 3.177942622 x 10^15 Hz; E 13.14958523 eV; Ω 28.28103857 m²/s	$R\left(\frac{1}{1}-\frac{1}{36}\right)$	.9722
24/25	.9600	95.53641971 nm; 10,467,212.43 m-1; 3.137991343 x 10^15 Hz; E 12.98427616 eV; Ω 28.64109809 m²/s	$R\left(\frac{1}{1}-\frac{1}{25}\right)$	.96
15/16	.9375	97.82929378 nm; 10,221,5587.14 m-1; 3.064444671 x 10^15 Hz; E 12.67995718 eV; Ω 29.32848445 m²/s	$R\left(\frac{1}{1}-\frac{1}{16}\right)$	.9375
8/9	.8888	103.1793333 nm; 9,691,863.362 m-1; 2.90554754 x 10^15 Hz; E 12.02247792 eV; Ω 30.93238594 m²/s	$R\left(\frac{1}{1}-\frac{1}{9}\right)$	.888
3/4	.7500	122.2866172 nm; 8,177,509.712 m-1; 2.451555737 x 10^15 Hz; E 10.14396575 eV; Ω 36.66060556 m²/s	$R\left(\frac{1}{1}-\frac{1}{4}\right)$	.75

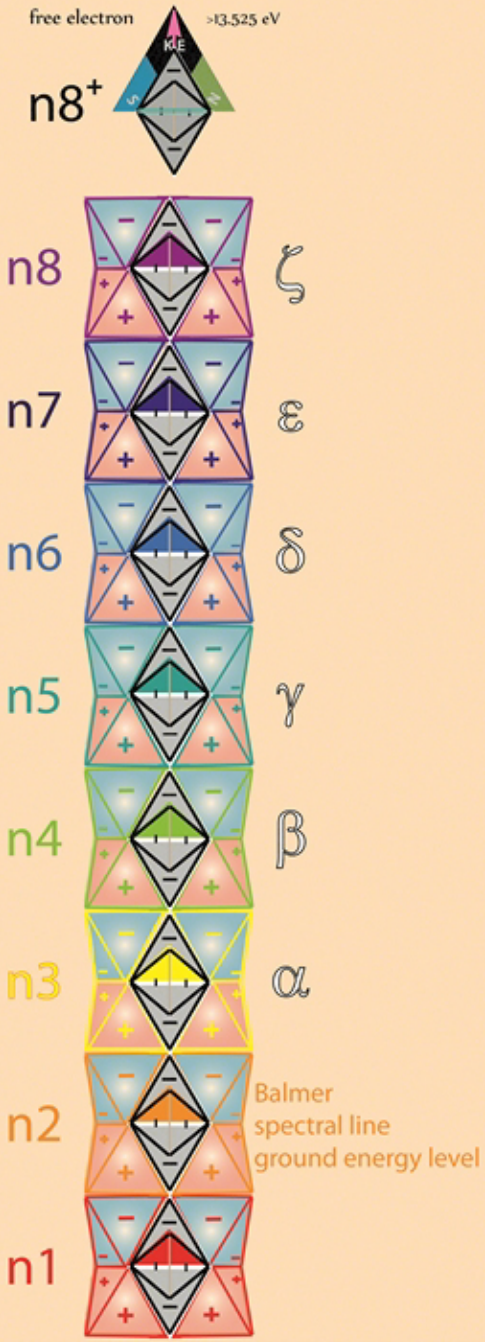
ground KEM energies

$$m.\begin{bmatrix}\Omega/v\\ v/\Omega\\ c^2/\Omega\\ v^1/c^2\end{bmatrix}$$

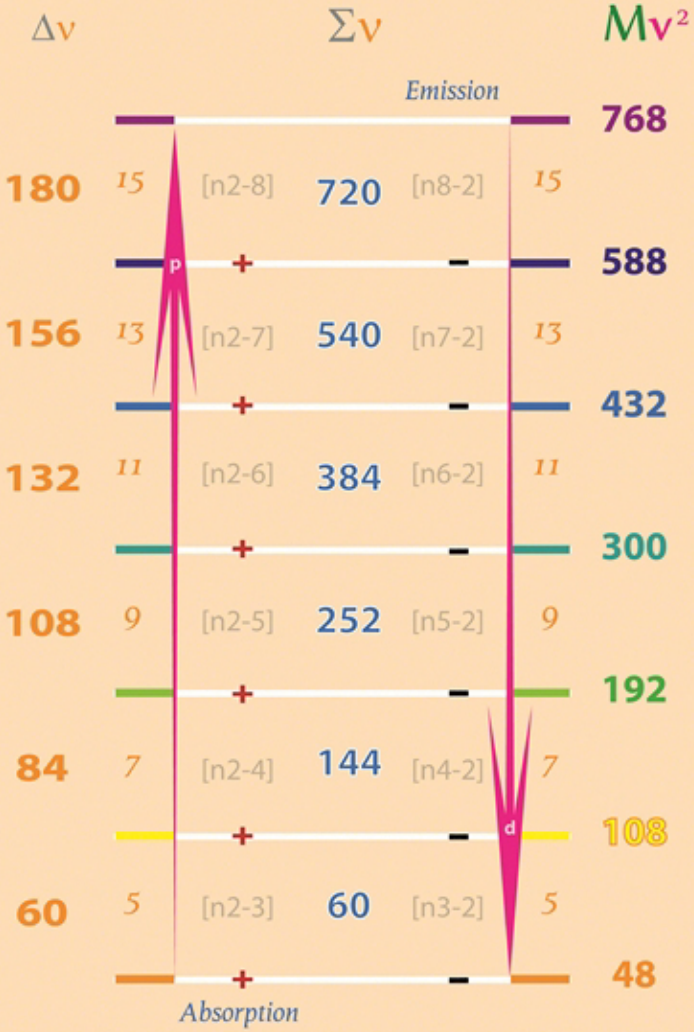
λ	91.71496292	nm
$\tilde{\nu}$	10,903,346.28	m-1
f	3.268740982 x 10^15	Hz
E	13.52528	eV
Ω	27.49545417	m²/s

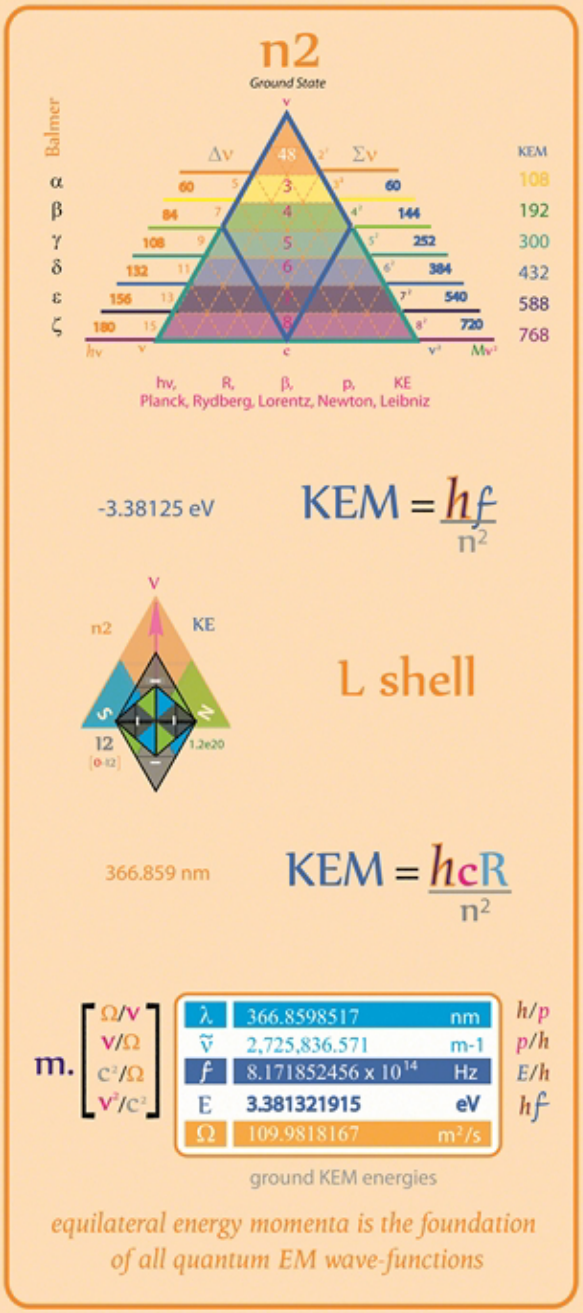
h/p
p/h
E/h
hf

changing energy momenta produces specific frequency spectral lines

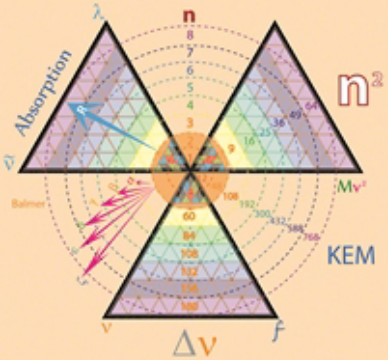


Balmer spectral lines





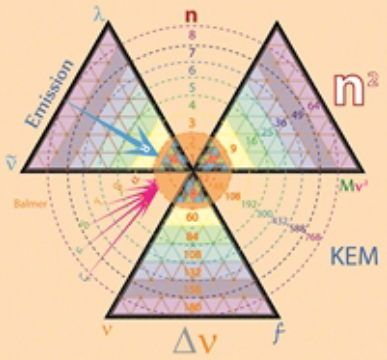
As photo-electrons transition between Mv squared KEM field energy levels in atomic nuclei they release specific [Δhν] W bosons



Balmer spectral series

α	660.34	n2-3
β	489.14	n2-4
γ	436.73	n2-5
δ	412.71	n2-6
ε	399.46	n2-7
ϕ	391.31	n2-8

Visible Spectrum



L shell

$$\frac{\Delta\nu}{KEM}$$

60

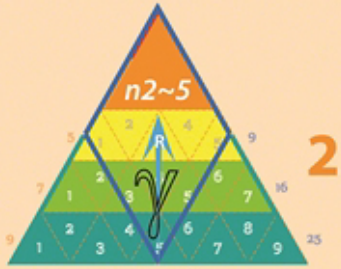
108

1 quantum level jump

144

192

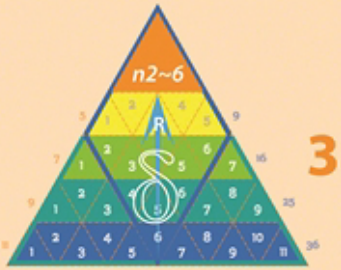
2 quantum level jump



252

300

3 quantum level jump



384

432

4 quantum level jump

540

588

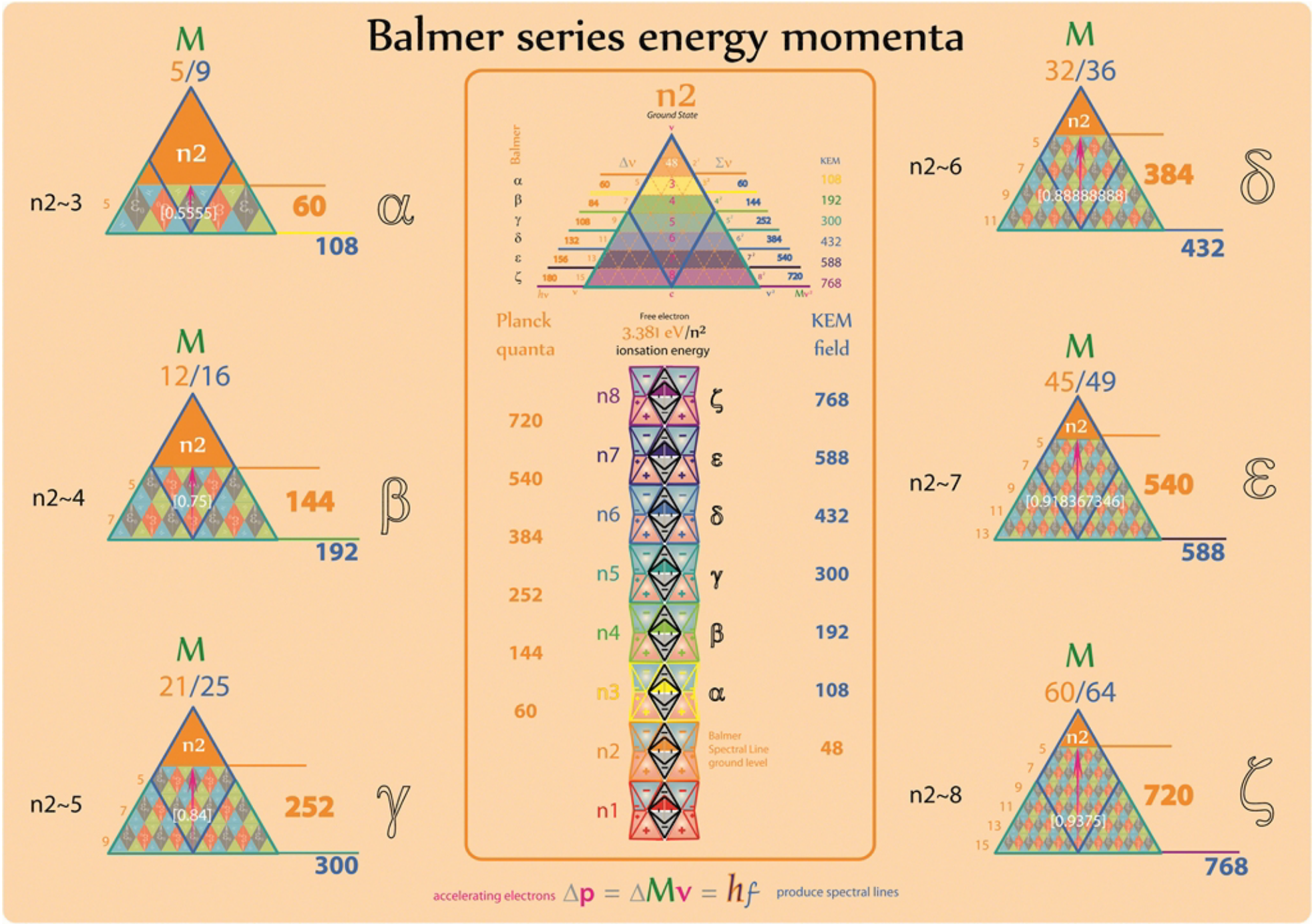
5 quantum level jump

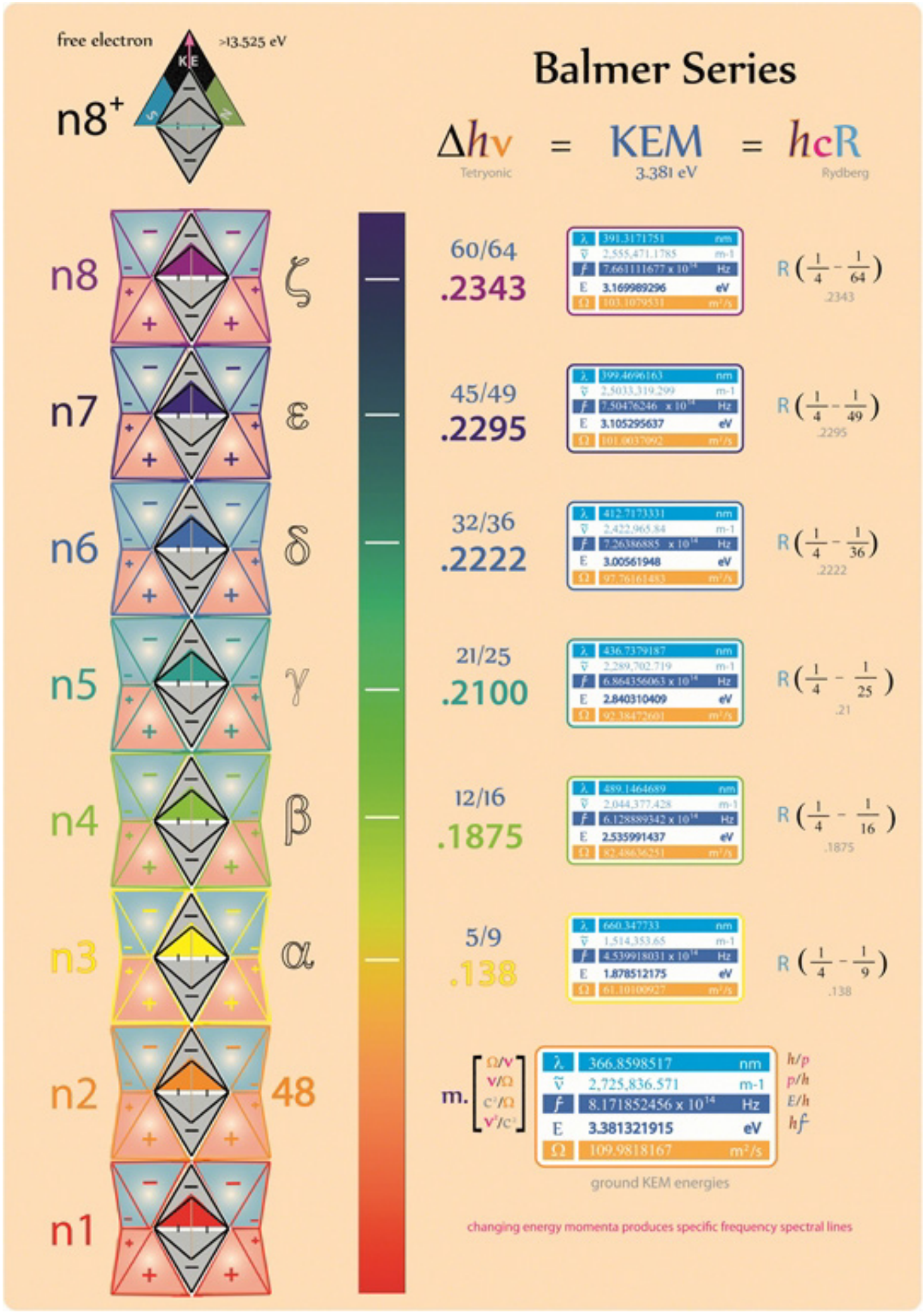
720

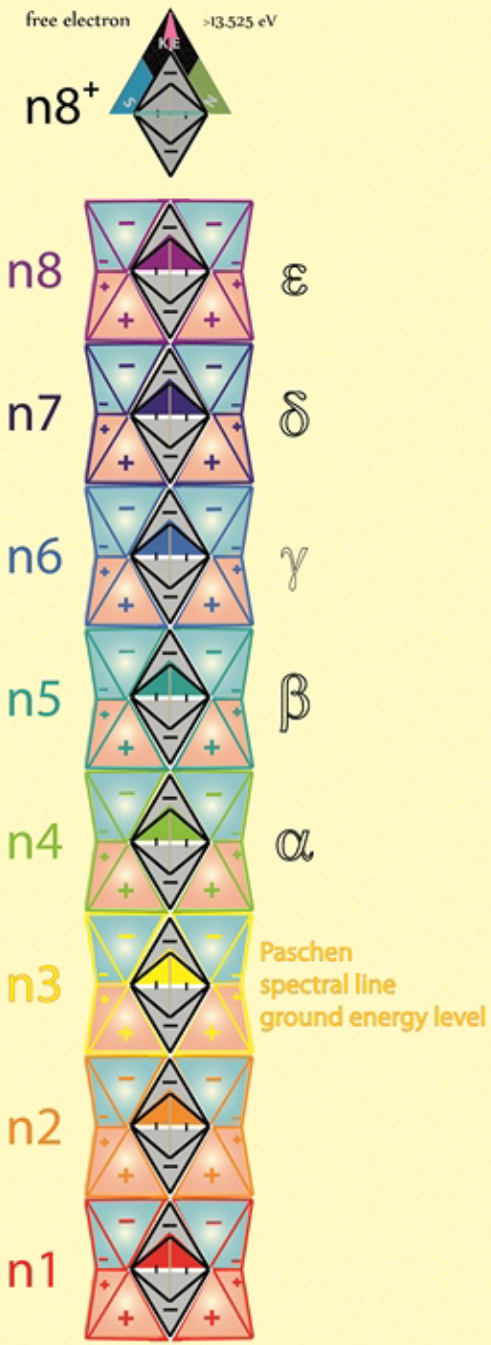
768

6 quantum level jump

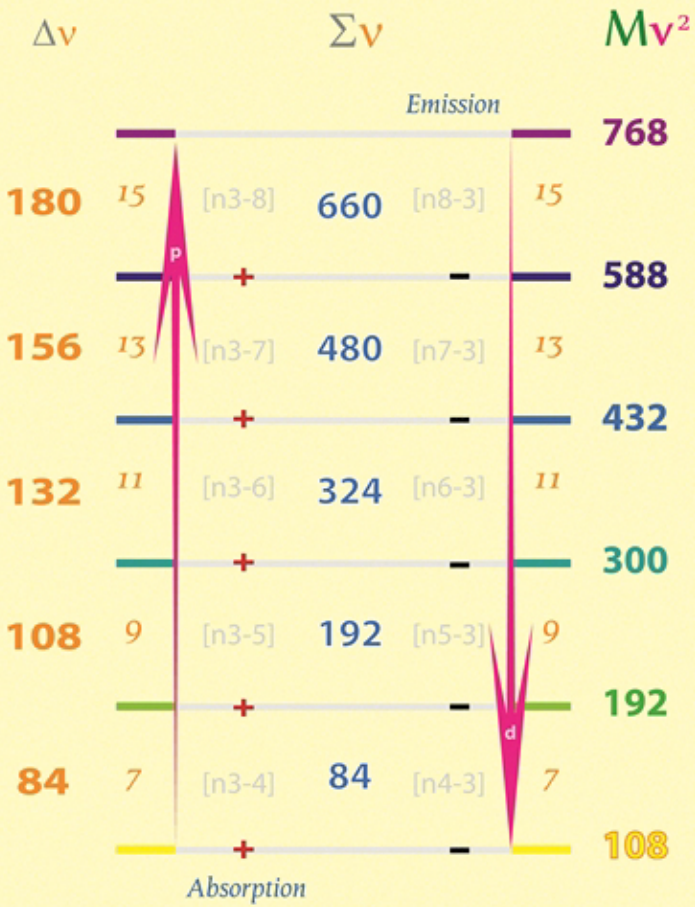
Balmer series energy momenta







Paschen spectral lines



-1.50280974 eV

$$KEM = \frac{hf}{n^2}$$

M shell

825.434 nm

$$KEM = \frac{hcR}{n^2}$$

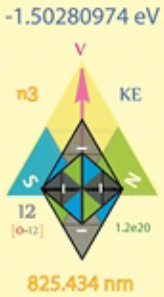
m. [Ω/v, v/Ω, c²/Ω, v²/c²]

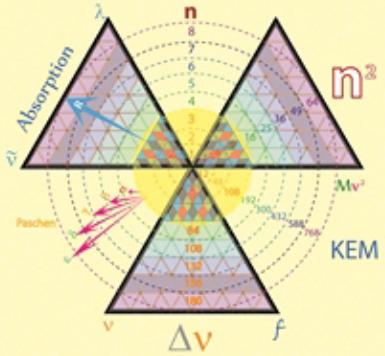
λ	825.4346663	nm	h/p
ν̃	1,211,482.92	m-1	p/h
f	3.631934425 x 10¹⁴	Hz	E/h
E	1.50280974	eV	hf
Ω	247.4590875	m²/s	

ground KEM energies

equilateral energy momenta is the foundation of all quantum EM wave-functions

As photo-electrons transition between Mv squared KEM field energy levels in atomic nuclei they release specific [Δhν] W bosons

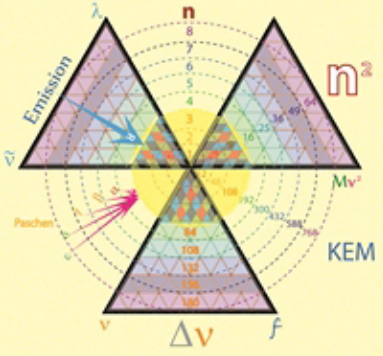




Paschen spectral series

α	1,886	n3-4
β	1,289	n3-5
γ	1,100	n3-6
δ	1,011	n3-7
ε	960	n3-8

IR spectrum



M shell

$$\frac{\Delta\nu}{KEM}$$

84

192

1 quantum level jump

192

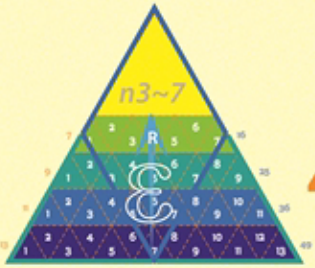
300

2 quantum level jump

324

432

3 quantum level jump



480

588

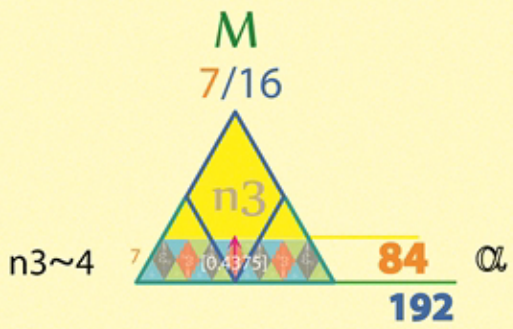
4 quantum level jump

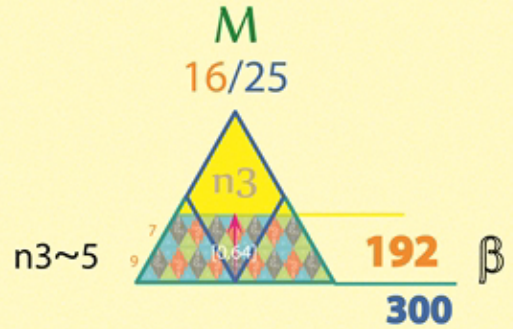
660

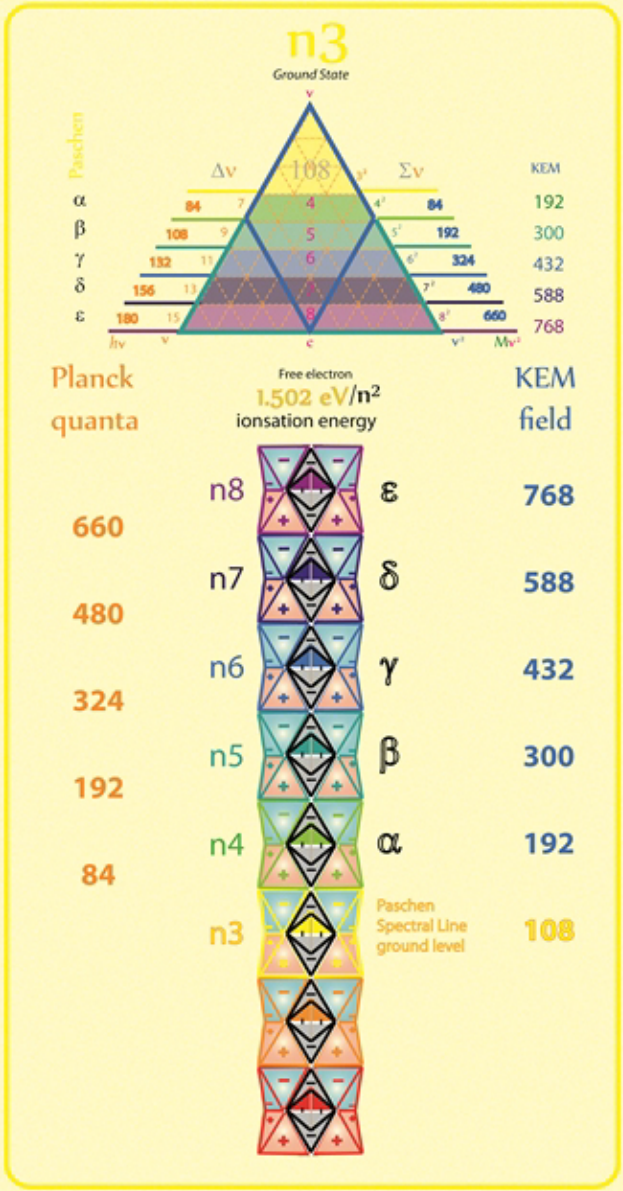
768

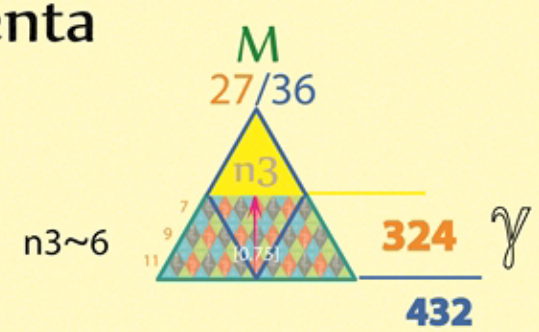
5 quantum level jump

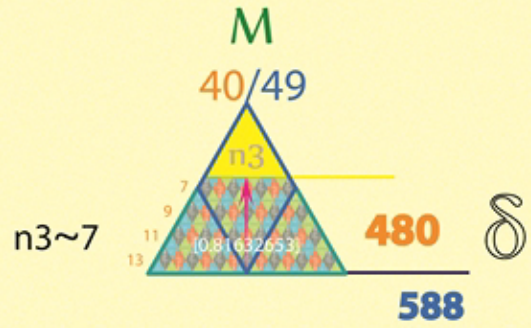
Paschen series energy momenta

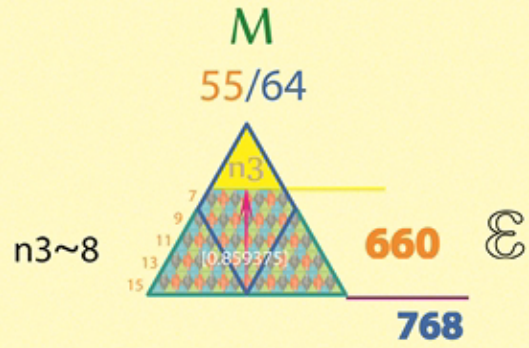




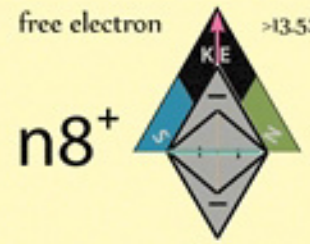








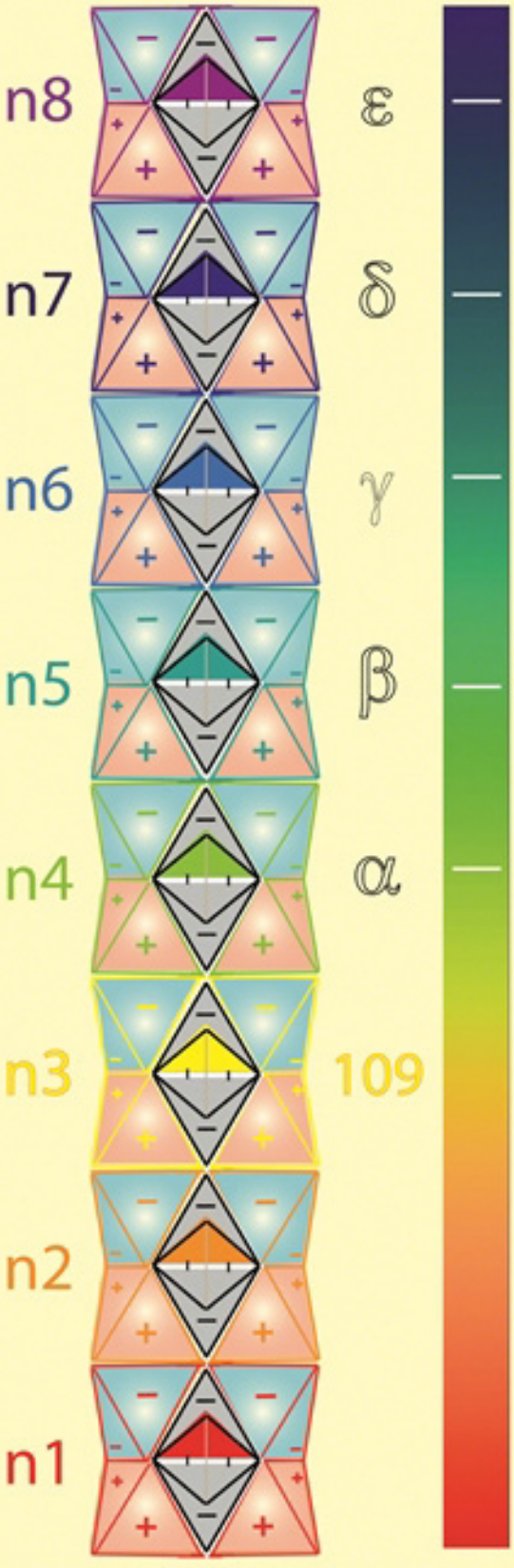
accelerating electrons $\Delta p = \Delta M v = hf$ produce spectral lines



Paschen Series

$$\Delta h\nu = KEM = hcR$$

Tetryonic — 1.502 eV — Rydberg



55/64 .0954	λ	960.5057935	nm	$R\left(\frac{1}{9}-\frac{1}{64}\right)$ .09548
	ν̃	1,041,118.135	m-1	
	f	3.121193646 x 10^{14}	Hz	
	E	1.29147712	eV	
	Ω	287.9523928	m^2/s	
40/49 .0907	λ	1,011.157466	nm	$R\left(\frac{1}{9}-\frac{1}{49}\right)$ .0907
	ν̃	988,965.6492	m-1	
	f	2.9464844428 x 10^{14}	Hz	
	E	1.226783461	eV	
	Ω	303.1373822	m^2/s	
27/36 .8033	λ	1,100.579555	nm	$R\left(\frac{1}{9}-\frac{1}{36}\right)$ .0833
	ν̃	908,612.1902	m-1	
	f	2.723950819 x 10^{14}	Hz	
	E	1.127107305	eV	
	Ω	329.94545	m^2/s	
16/25 .0711	λ	1,289.741666	nm	$R\left(\frac{1}{9}-\frac{1}{25}\right)$ .0711
	ν̃	775,349.069	m-1	
	f	2.324438032 x 10^{14}	Hz	
	E	0.961798233	eV	
	Ω	386.6548243	m^2/s	
7/16 .0486	λ	1,886.707809	nm	$R\left(\frac{1}{9}-\frac{1}{16}\right)$ .0486
	ν̃	530,023.7776	m-1	
	f	1.588971311 x 10^{14}	Hz	
	E	0.657479261	eV	
	Ω	565.6207715	m^2/s	

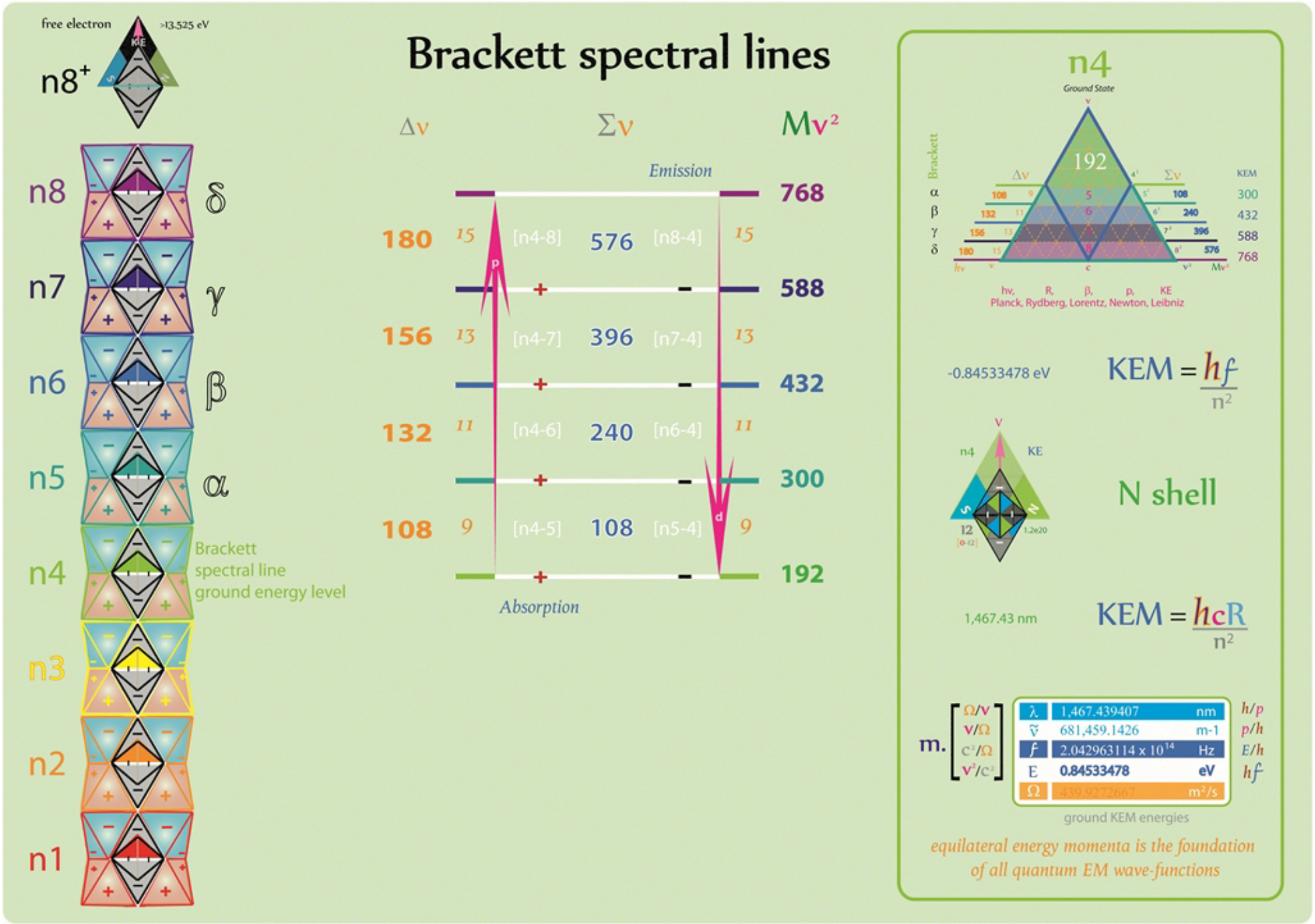
$$m. \left[\begin{matrix} \Omega/v \\ v/\Omega \\ c^2/\Omega \\ v^2/c^2 \end{matrix}\right]$$

λ	825.4346663	nm
ν̃	1,211,482.92	m-1
f	3.631934425 x 10^{14}	Hz
E	1.50280974	eV
Ω	247.4590875	m^2/s

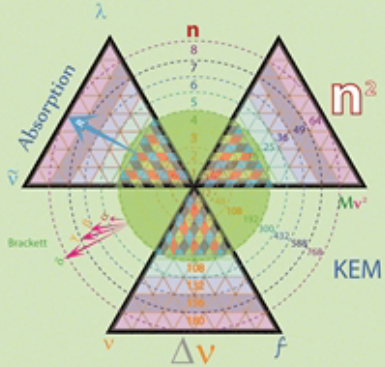
h/p p/h E/h hf

ground KEM energies

changing energy momenta produces specific frequency spectral lines



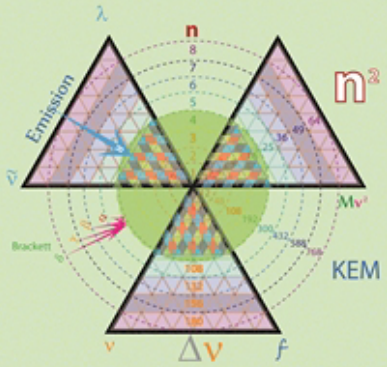
As photo-electrons transition between Mv squared KEM field energy levels in atomic nuclei they release specific [Δhν] W bosons



Brackett spectral series

α	4,076	n4-5
β	2,641	n4-6
γ	2,178	n4-7
δ	1,956	n4-8

IR spectrum



N shell

$$\frac{\Delta\nu}{KEM}$$

108

300

1 quantum level jump

240

432

2 quantum level jump

396

588

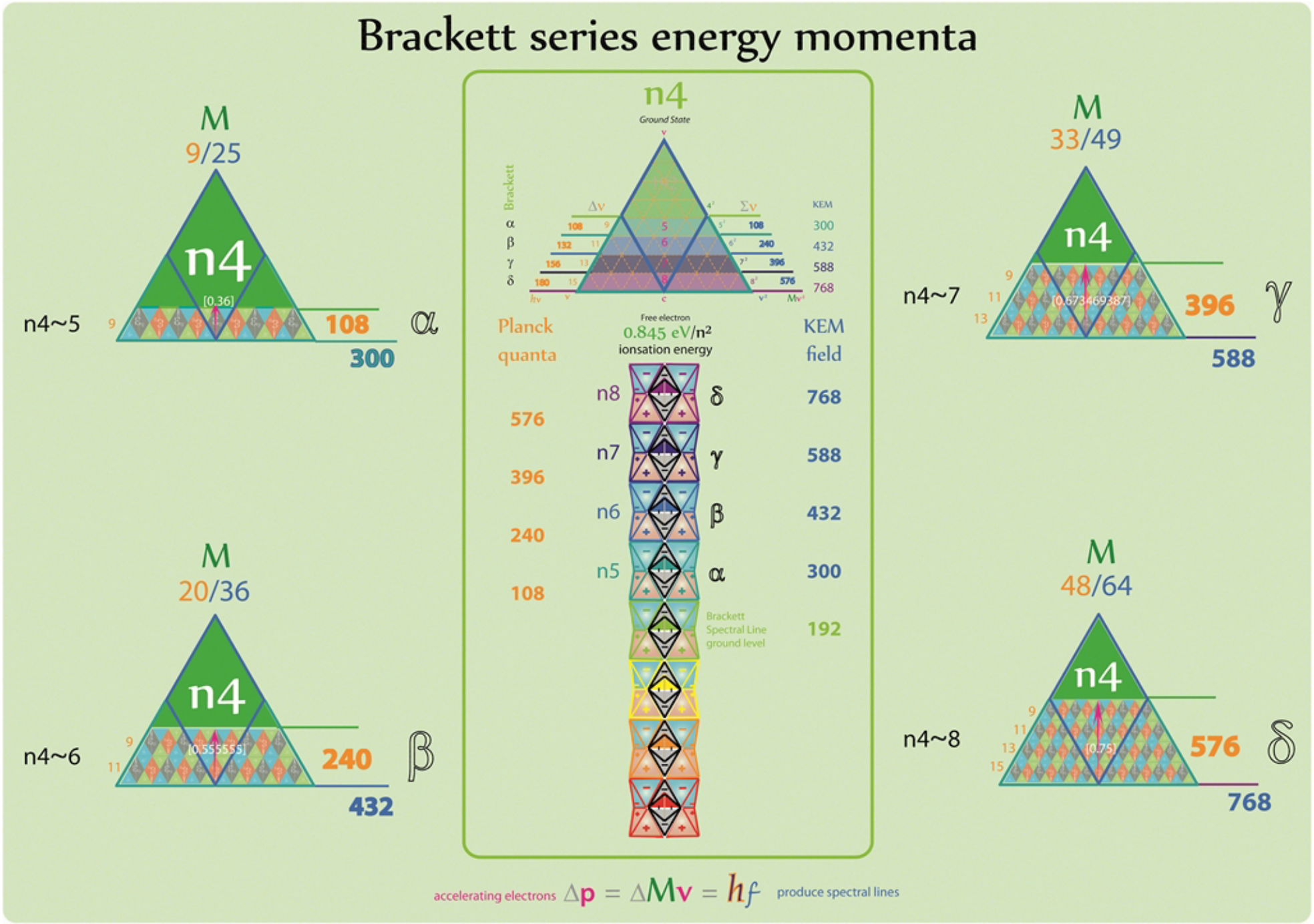
3 quantum level jump

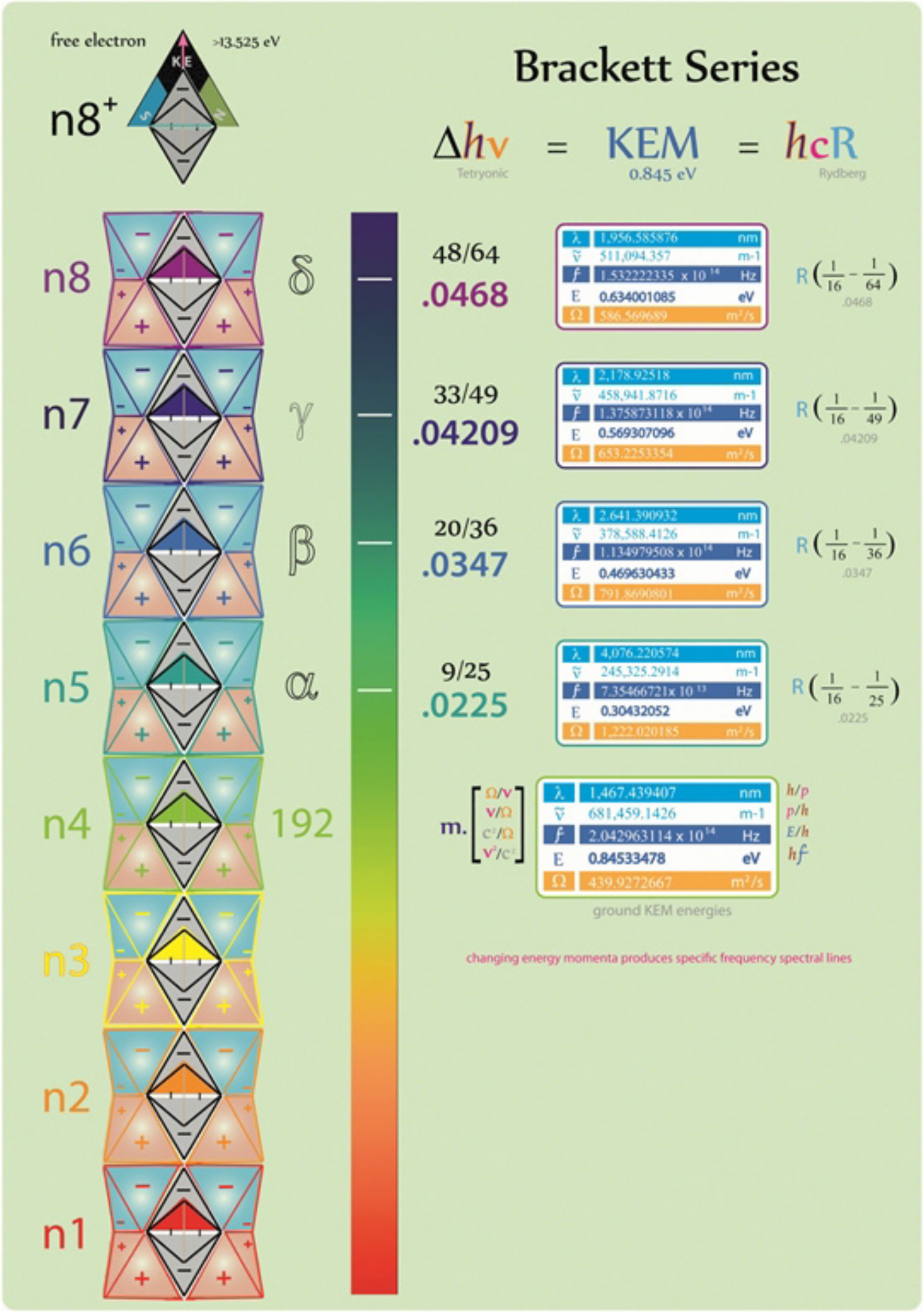
576

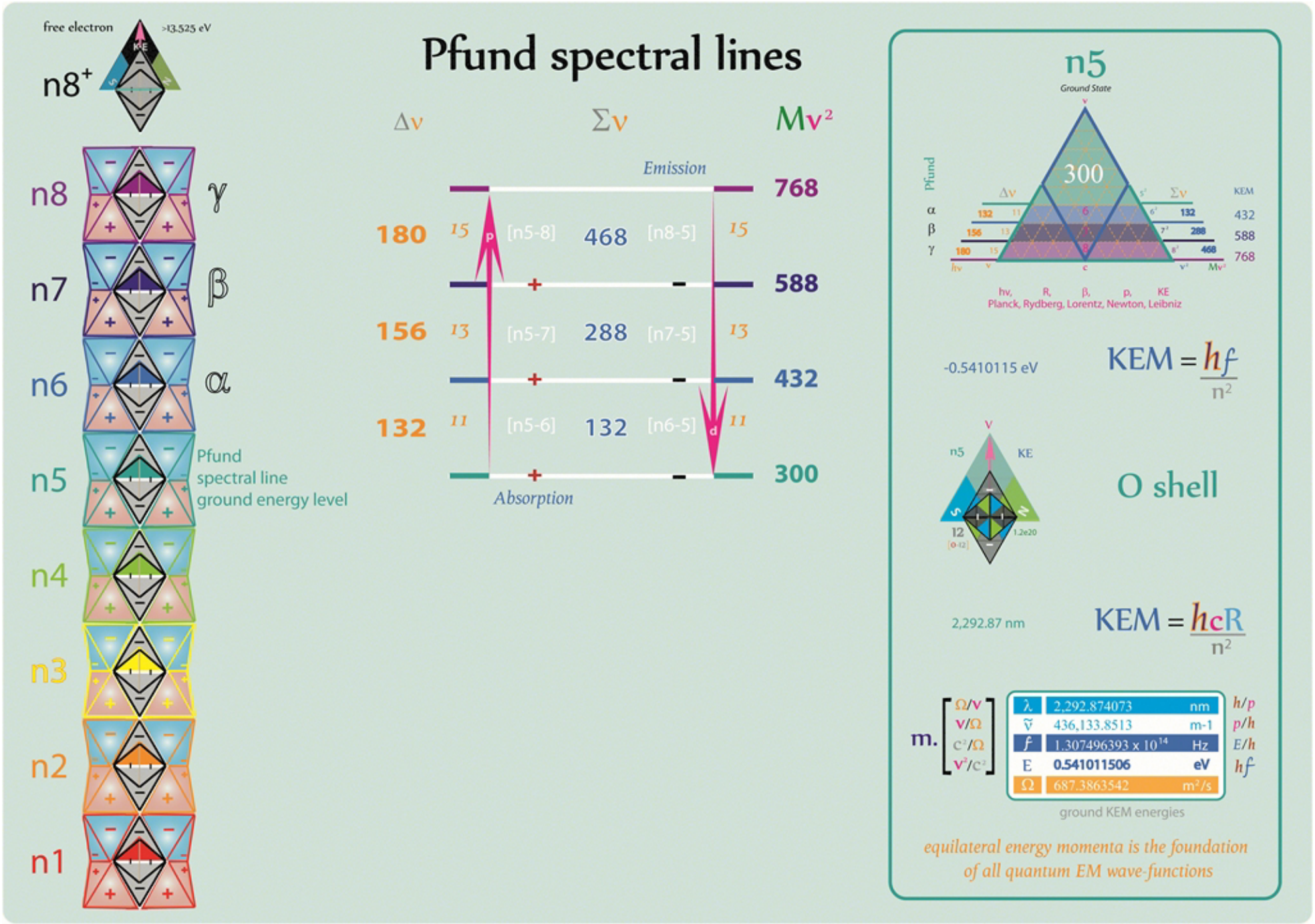
768

4 quantum level jump

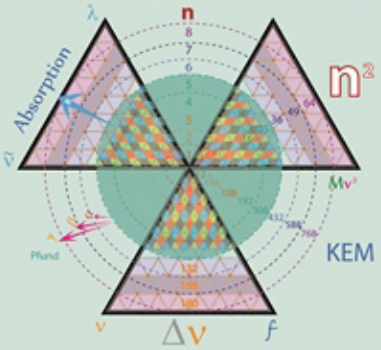
Brackett series energy momenta







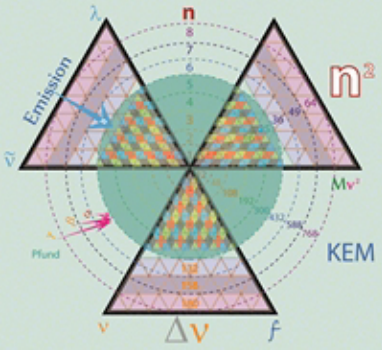
As photo-electrons transition between Mv squared KEM field energy levels in atomic nuclei they release specific [Δhν] W bosons



Pfund spectral series

α	7,503	n5-6
β	4,681	n5-7
γ	3,762	n5-8

IR spectrum



O shell

$$\frac{\Delta\nu}{KEM}$$

132

432

1 quantum level jump

288

588

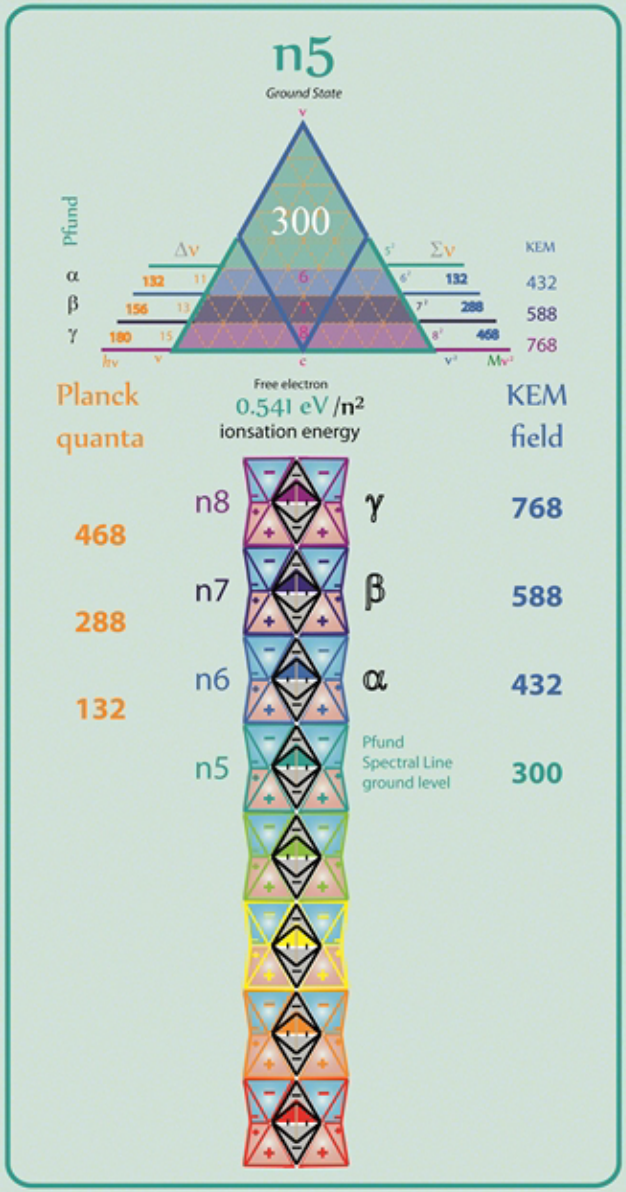
2 quantum level jump

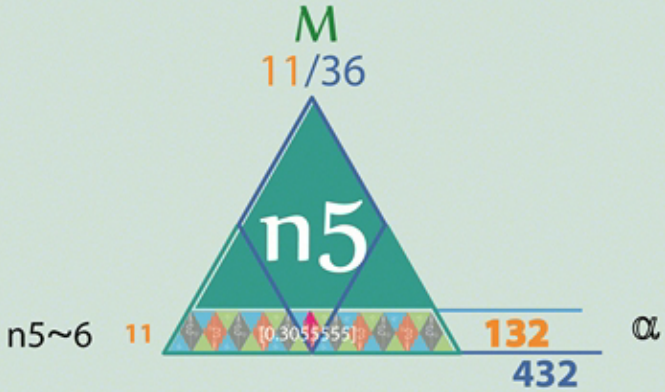
468

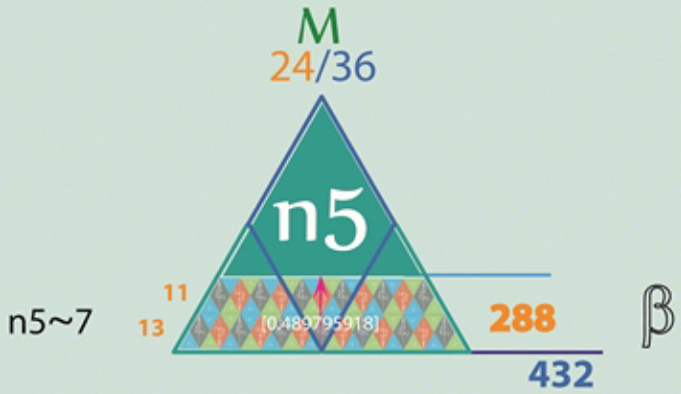
768

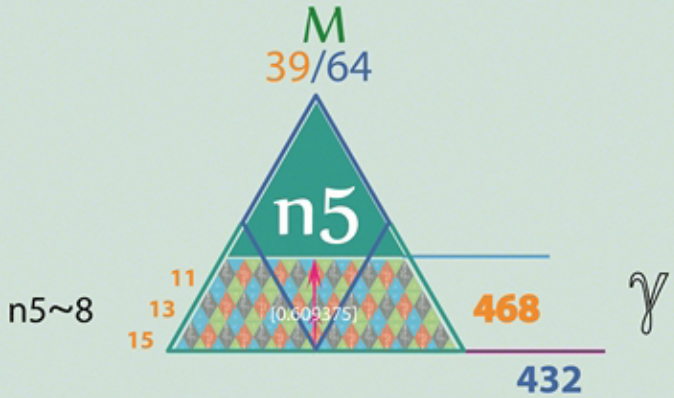
3 quantum level jump

Pfund series energy momenta

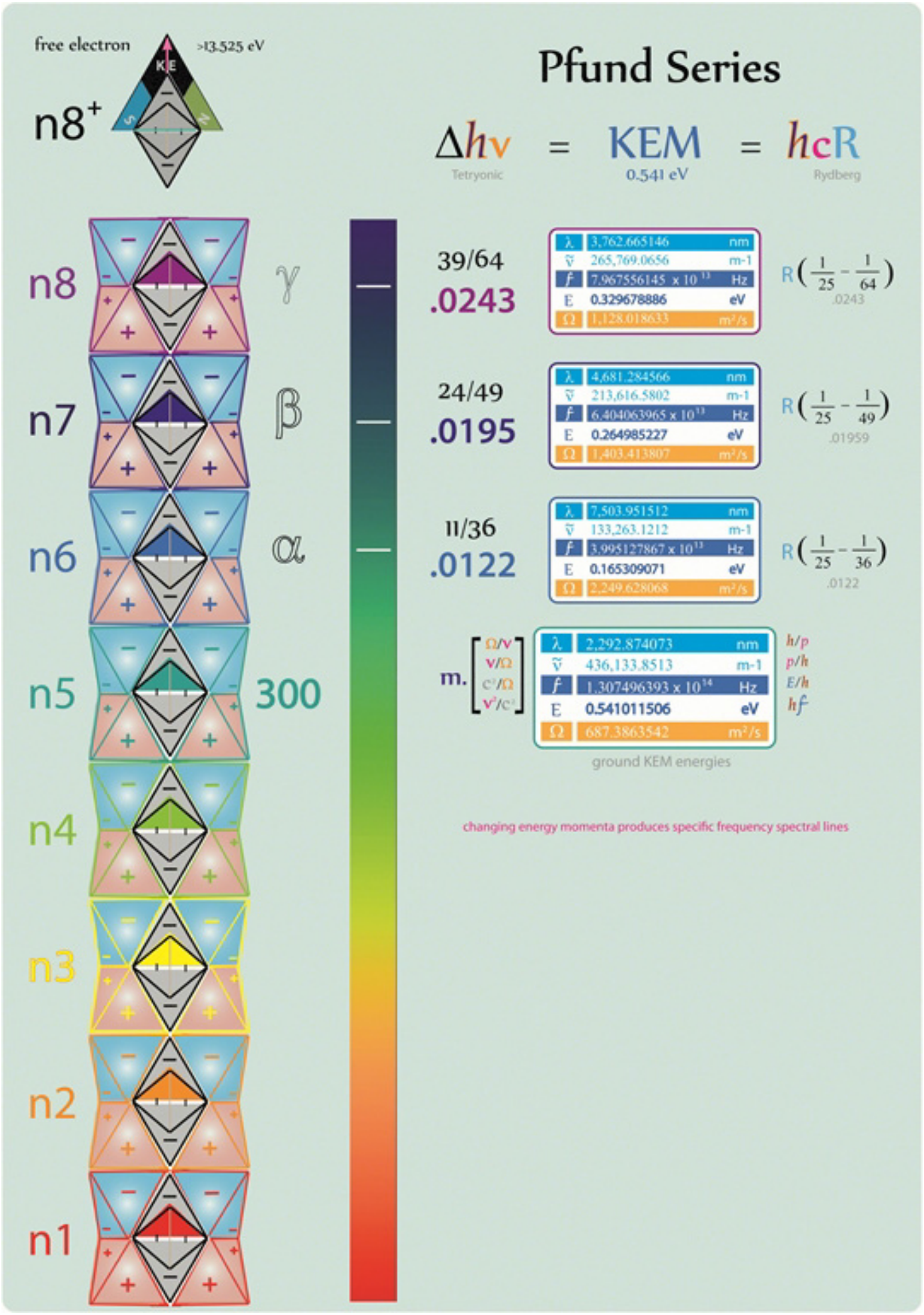


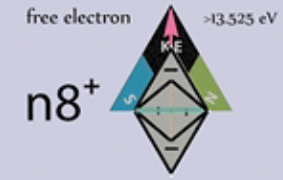




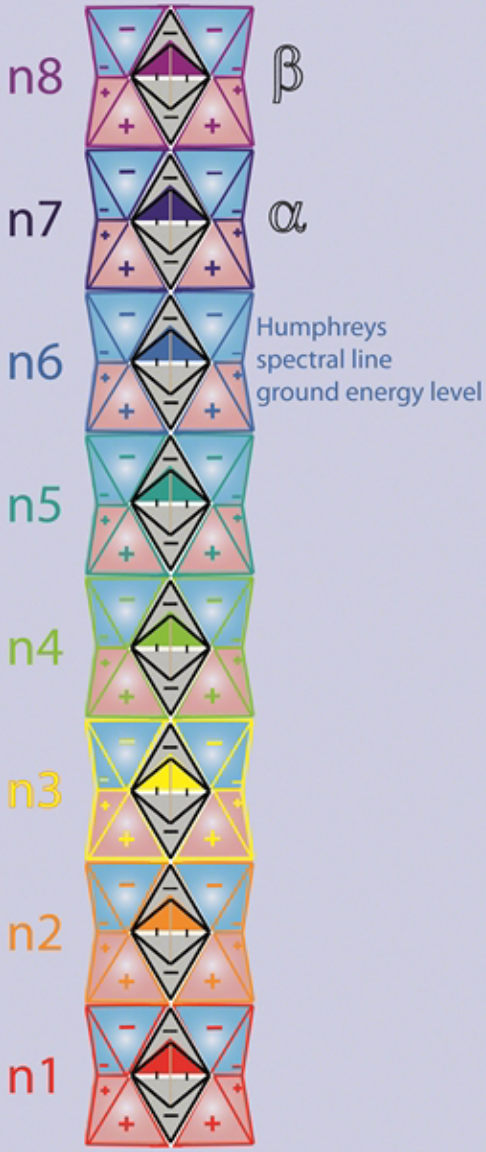


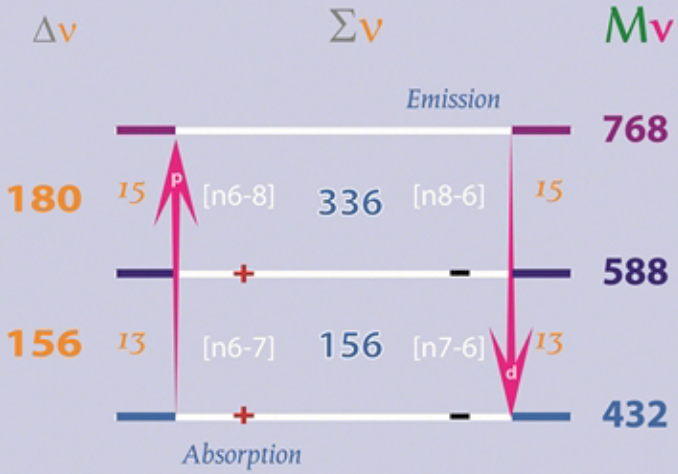
accelerating electrons $\Delta p = \Delta M v = hf$ produce spectral lines

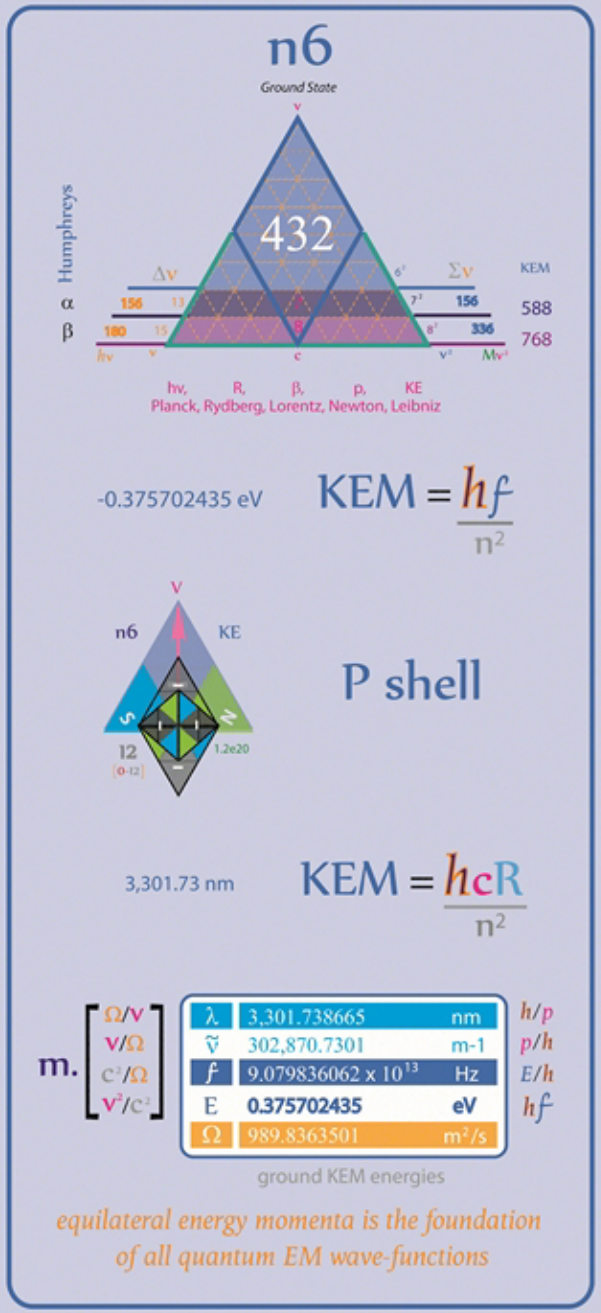




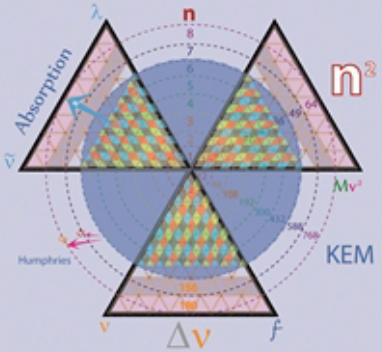
Humphreys spectral lines







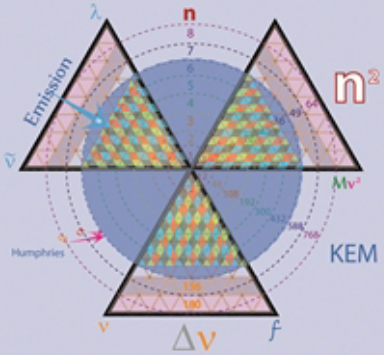
As photo-electrons transition between Mv squared KEM field energy levels in atomic nuclei they release specific [Δhν] W bosons



Humphries spectral series

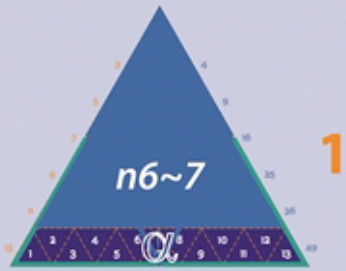
α	12,445	n6-7
β	7,546	n6-8

IR spectrum



P shell

$$\frac{\Delta\nu}{KEM}$$



156

588

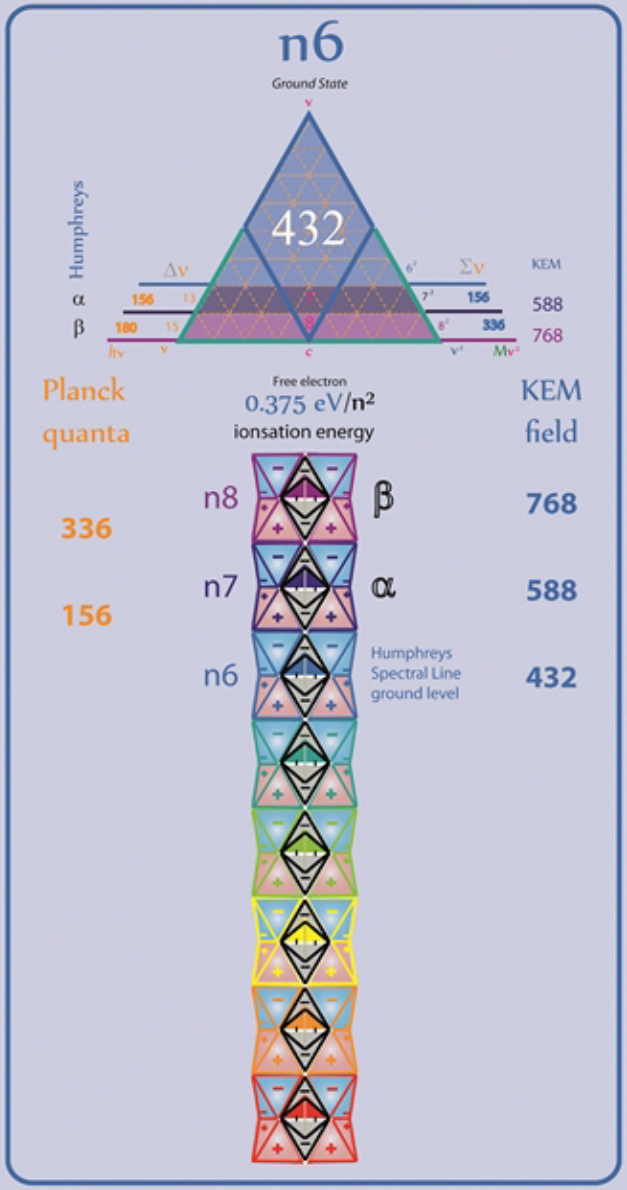
1 quantum level jump

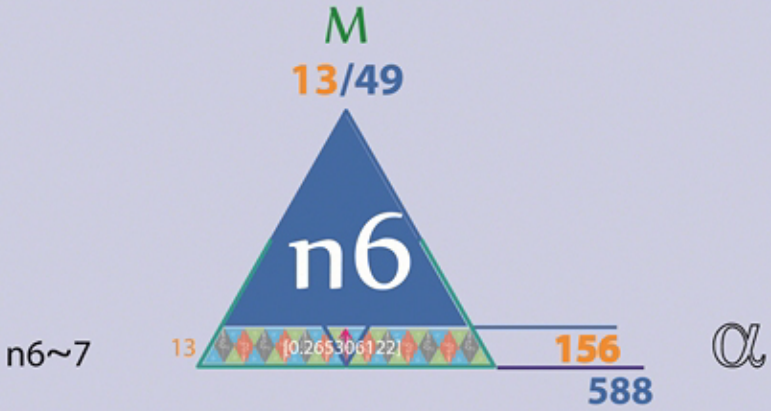
336

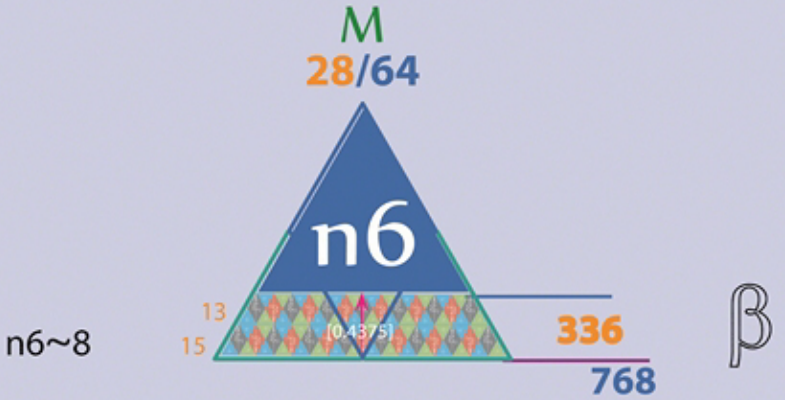
768

2 quantum level jump

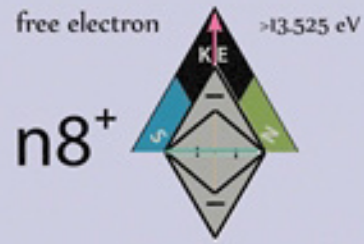
Humphreys series energy momenta







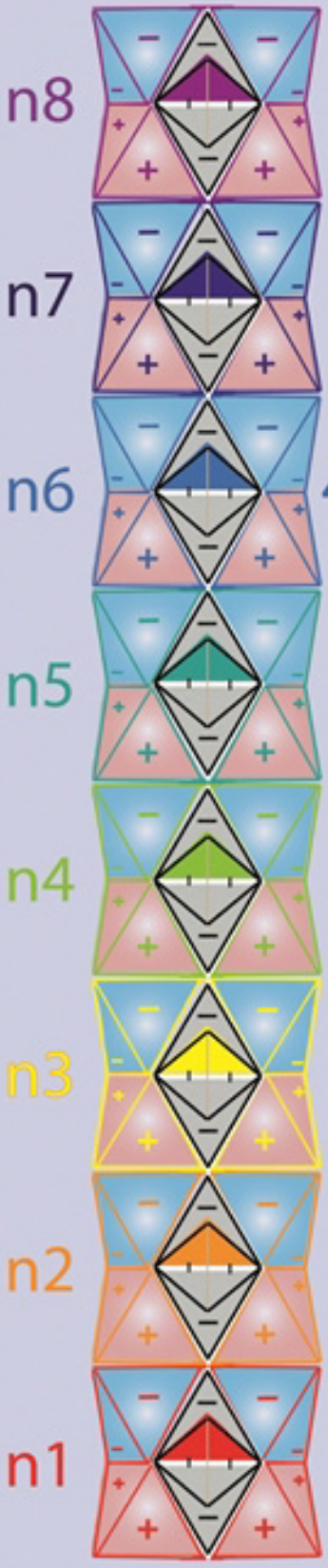
accelerating electrons $\Delta p = \Delta M v = hf$ produce spectral lines



Humphreys Series

$$\Delta h\nu = KEM = hcR$$

Tetryonic — 0.375 eV — Rydberg



28/64
.01215

λ	7,546.831235	nm
ν̄	132,505.9444	m-1
f	3.972428277 x 10^13	Hz
E	0.164369815	eV
Ω	1,128.018633	m²/s

$R\left(\frac{1}{36} - \frac{1}{64}\right)$ .01215

13/49
.00733

λ	12,445.01497	nm
ν̄	80,353.459	m-1
f	2.4089936098x 10^13	Hz
E	0.099676156	eV
Ω	1,403.413807	m²/s

$R\left(\frac{1}{36} - \frac{1}{49}\right)$ .0073

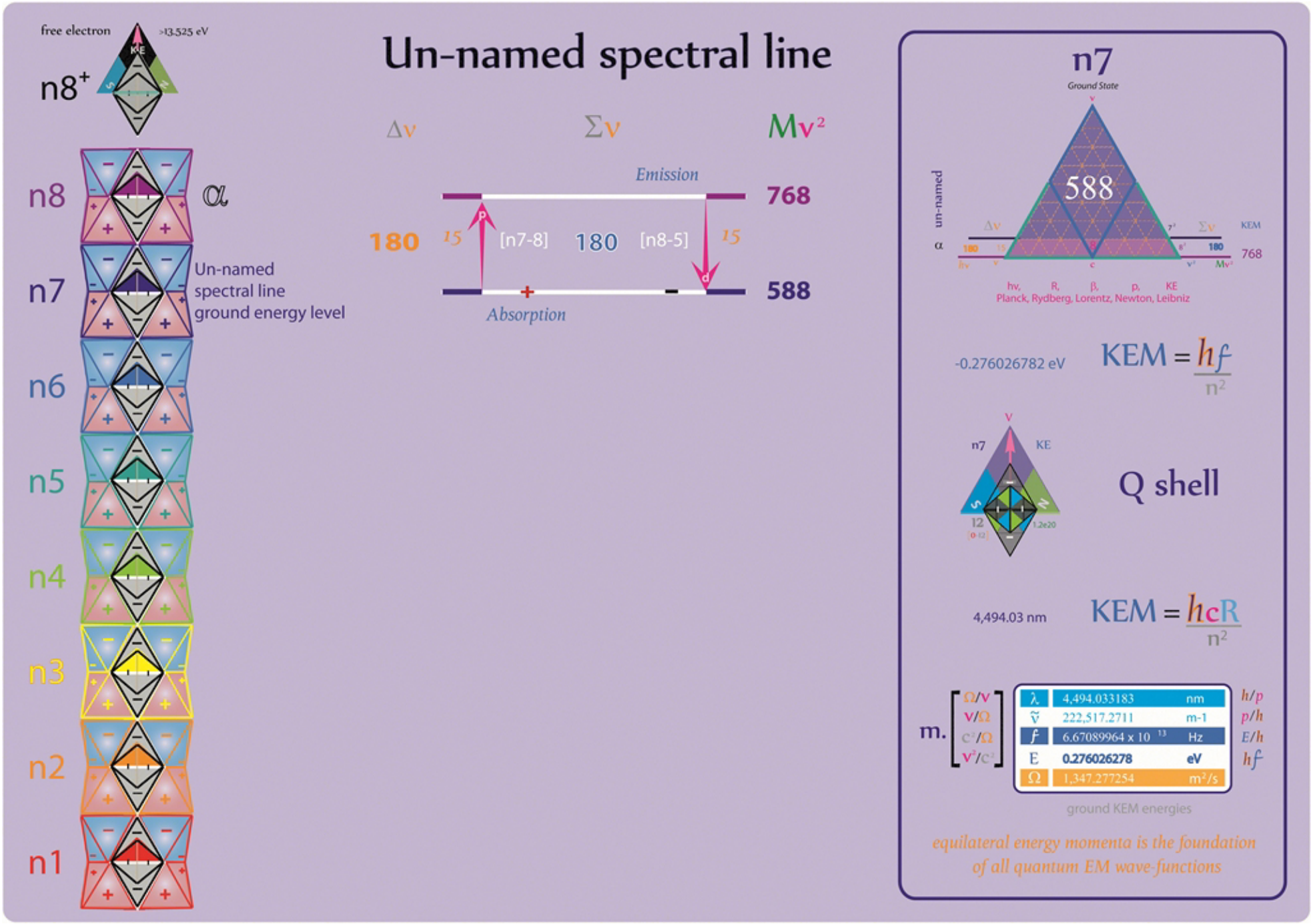
m. [Ω/v, v/Ω, c²/Ω, v²/c²]

λ	3,301.738665	nm
ν̄	302,870.7301	m-1
f	9.079836062 x 10^13	Hz
E	0.375702435	eV
Ω	989.8363501	m²/s

h/p
p/h
E/h
hf

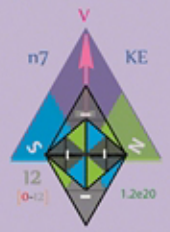
ground KEM energies

changing energy momenta produces specific frequency spectral lines

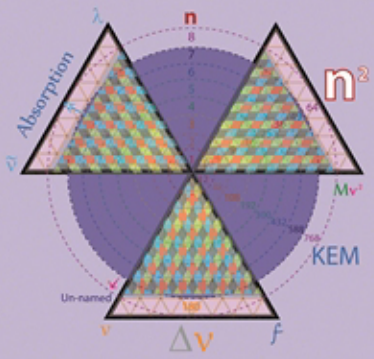


*This spectral line photo-electrons transition can only release **one** specific [Δhν] W boson of energy*

-0.276026782 eV



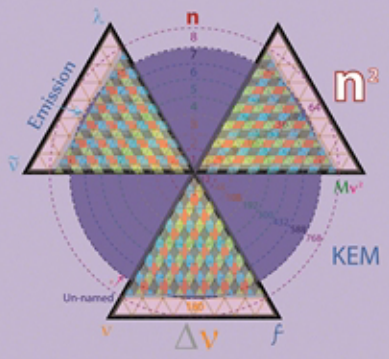
4,494.03 nm



Un-named spectral series

α 19,174 n1-8

IR spectrum



Q shell

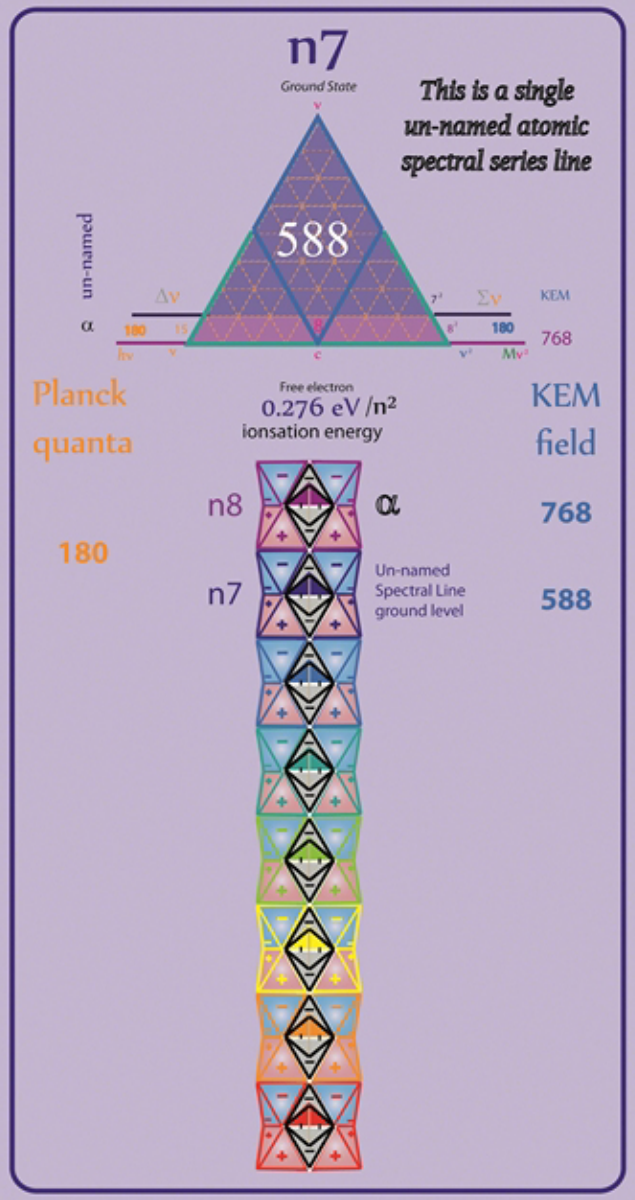
Δν / KEM

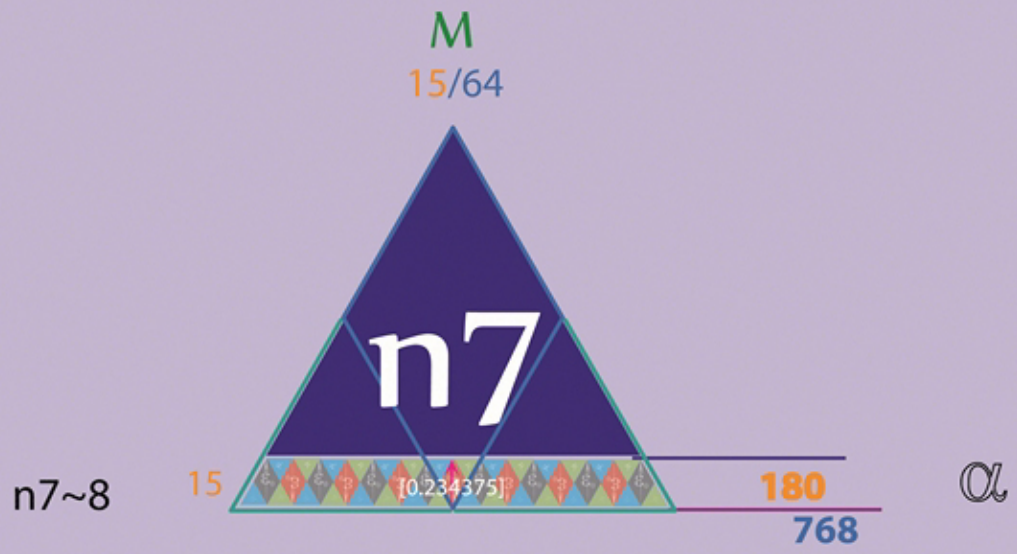
180

768

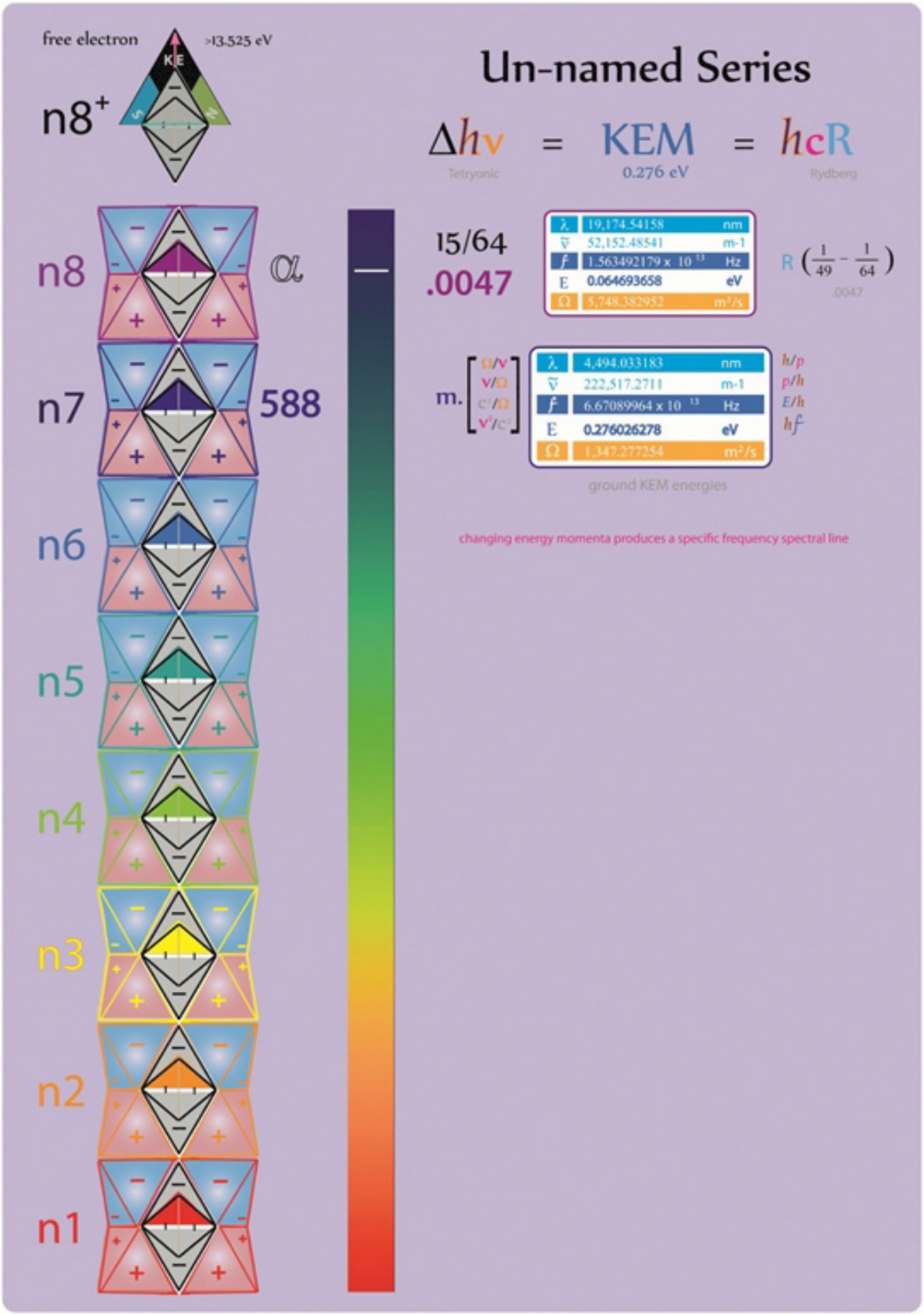
1 quantum level jump

Un-named series energy momenta





accelerating electrons $\Delta p = \Delta Mv = hf$ produce spectral lines



KEM field geometry

The Lorentz corrected velocity of electron resulting from atomic energy level transitions

Bosons differential required to effect energy level transition

Energy differential for energy level transition

Mv^2

12x1
12x4
12x9
12x16
12x25
12x36
12x49
12x64

All of the quantum jumps of electrons bound in a Hydrogen atom can be summerised in the Tetryonic geometry reflecting the energy level transitions

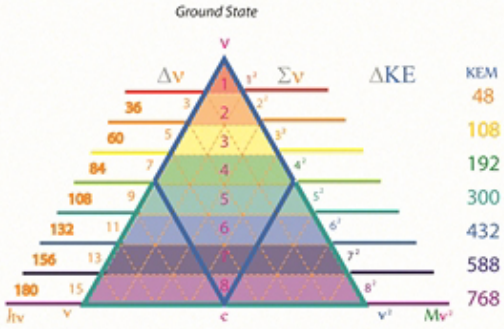
Ryberg's formula is a mathematical description of Tetryonic energy geometry

Ryberg's constant is reflective of the wavelengths and linear momentum of a transitioning electron's KEM field

$$Mv^2 = KEM = hcR_H$$

KEM field quanta

Photoelectron transitions

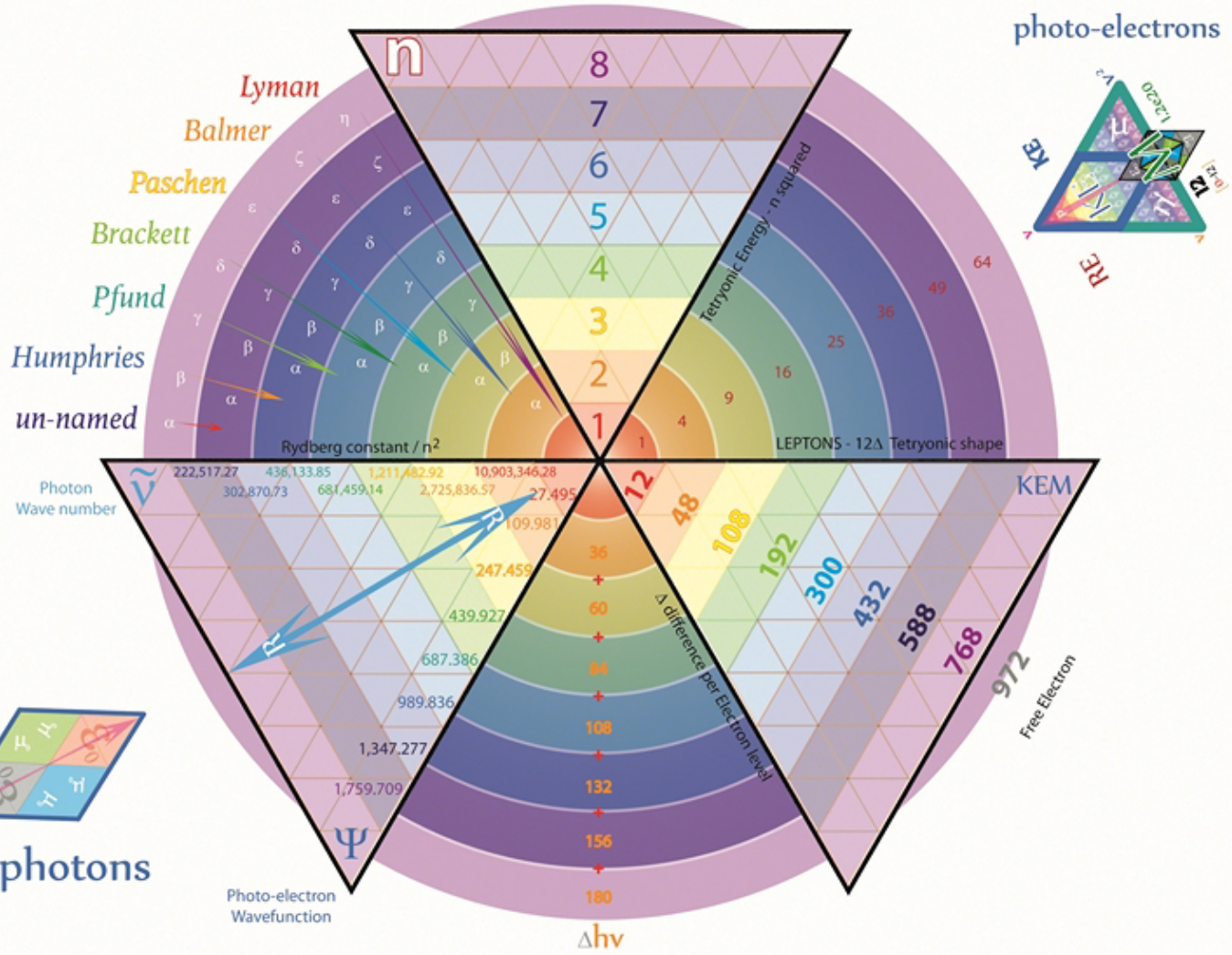


Spectral Lines

Transition		Spectral series	
n1~	n2 91.29	α	Lyman UV spectra
	n3 91.30	β	
	n4 91.32	γ	
	n5 91.33	δ	
	n6 91.36	ε	
	n7 91.38	ϕ	
	n8 91.41	η	
n2~	n3 367.06	α	Balmer Visible Spectra
	n4 367.23	β	
	n5 367.28	γ	
	n6 367.54	δ	
	n7 368.19	ε	
	n8 368.59	ϕ	
n3~	n4 833.16	α	Paschen IR spectra
	n5 834.34	β	
	n6 835.68	γ	
	n7 837.23	δ	
	n8 839.02	ε	
n4~	n5 1499.69	α	Brackett
	n6 1503.50	β	
	n7 1507.87	γ	
	n8 1512.92	δ	
n5~	n6 2381.53	α	Pfund
	n7 2391.17	β	
	n8 2402.25	γ	
n6~	n7 3499.27	α	Humphreys
	n8 3520.12	β	
n7~	n8 4880.38	α	Un-named

Nuclear Quantum Levels

The kinetic energy levels of bound nuclear photon-electrons is determined by the energy levels of their Baryons



photons

Spectral lines are produced by

The energy and wavelength of emitted photons is a function of the photo-electron's KEM field quantum wavenumber

Quantum Transitions

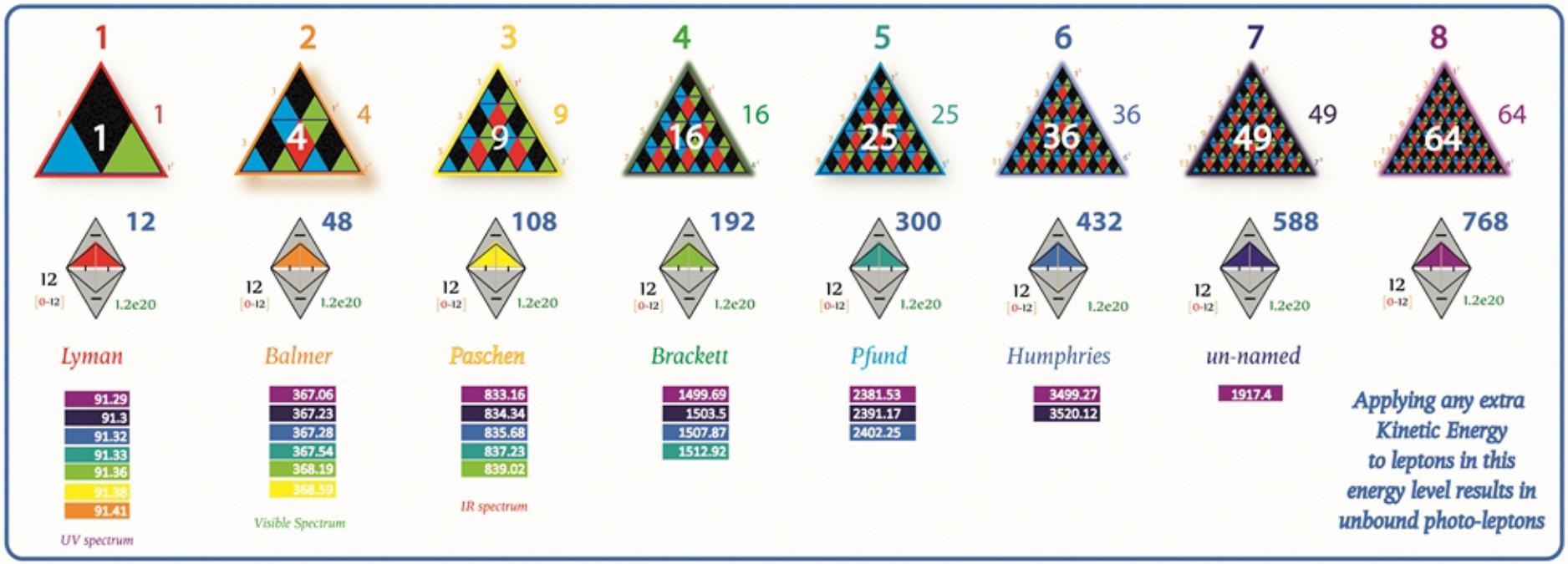
$$hf = \Delta Mv = \Delta p$$

27.49545

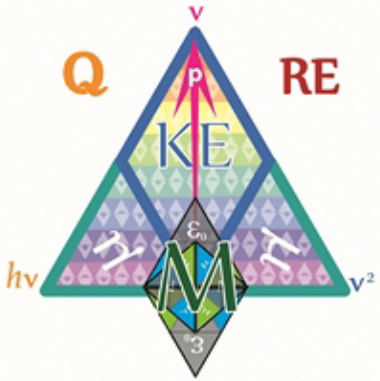
accelerating photo-electrons

Changes to the energy momenta of KEM fields produce changes to the linear momenta of photo-electrons

Photoelectric energy level transitions



$$Mv^2 = KEM = hcR_H$$



These specific quantum level steps create the Photoelectric effect

$$\Delta h\nu = \phi = hf$$

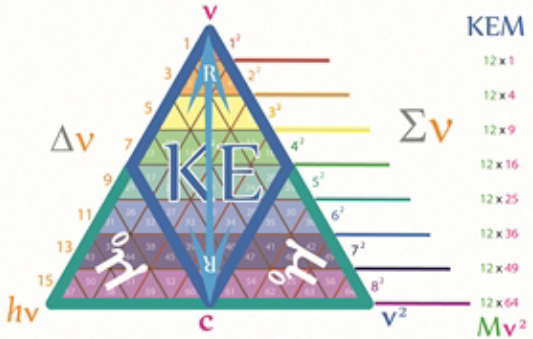


Photo-electrons bound to atomic nuclei
can only transition between Mv squared KEM energies
as a direct result of the energy levels of Baryons

The Photoelectric effect

The photoelectric effect was first observed in 1887 by Heinrich Hertz (1857-1894) during experiments with a spark-gap generator — the earliest form of radio receiver

$E_\gamma = hf$

There are specific frequencies of light that are more efficient at exciting photo-electrons from atoms

$p^2 = KEM = Mv^2$

The energies of the emitted electrons are independent of the intensity of the incident radiation but are dependent on the photon frequency

n2-4 specific transitions can release
8 times the number of electrons
that n3-4 can release &
4 times the number of electrons
that n1-4 can release

Photoelectrons with higher Kinetic energy ejected

Minimal energy Photoelectrons ejected

No Photoelectrons ejected

Any photon with
EM energies in excess of a specific
frequency produces a 'free' electron
with higher Kinetic energies
and linear momentum

n3 M 1

n2 L 8

n1 K 2

Soon after the discovery of Planck's Heat law and the quantisation of energy at the quantum level experiments by others, most notably Robert Millikan (1865-1953), found that light with frequencies below a certain cutoff value, called the threshold frequency, ould not eject photoelectrons from the metal surface no matter how bright the source

Photonic mass-energy momenta

Bosons

$$\text{ODD}\,\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta · Bosons · ElectroMagnetic · mass · velocity

$$2m\Omega v^2 = E = n.hf$$

All 2D EM waveforms possess mass-energy and momenta

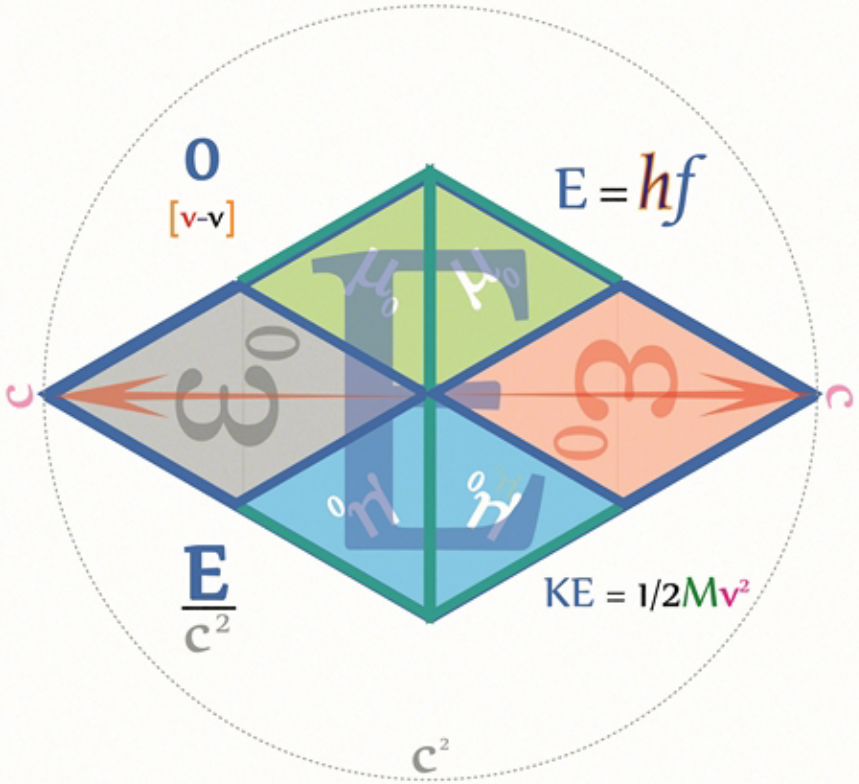
Photons

$$2\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta · Photons · ElectroMagnetic · mass · velocity

charged mass-energy-momentum

$$E = mv^2$$



radiant mass-energy momenta

$$E = hv^2$$

All 2D EM waveforms propagate at the speed of light

Velocity of Light

$$v = \left[\left[\frac{f}{\frac{c^2}{\Omega}}\right].\left[\frac{\lambda}{\frac{\Omega}{c}}\right]\right] = c$$

scalar frequency · linear wavelength · Speed of Light

Wave~Particle duality

First proposed by Christian Huygens in the 1600's, it wasn't until the 1800's
that Thomas Young proved this wave-particle duality with the classic double-slit experiment.

In 1678, Dutch physicist, Christiaan Huygens, believed that light was made up of waves vibrating up and down perpendicular to the direction of the light travels, and therefore formulated a way of visualising wave propagation.

This became known as 'Huygens' Principle' and was the successful theory of light wave motion in three dimensions

Sir Isaac Newton, held the theory based on his spetral observations that light was made up of tiny particles or 'corpusles of colour"

English physicist Thomas Young argued that Isaac Newton's theory of particle light was incorrect, and instead argued that light is a transverse wave.

In 1803, Thomas Young studied the interference of light waves by shining light through a screen with two slits equally separated, the light emerging from the two slits, spread out and produced wave-like interference patterns.

Sir Isaac Newton

(1643-1727)

Particles

Waves

Thomas Young

(1773-1829)

In 1900
Max Planck proposed the existence of a light quantum, [n.hv] a finite packet of energy which depends on the frequency and spectral energy of the radiation

In 1905
Albert Einstein, suggested that light is composed of tiny particles called photons, and that each photon has energy related to its frequency [hf].

Light - a Wave, or a Particle?

$$nh\nu = E = hf$$

Mathematically directly relating the number of Planck quanta [n.hv] with Photon frequencies [hf] and the frequent interchanging of one term for the other in physics is the source of considerable quantum confusion

$$2h\nu = hf$$

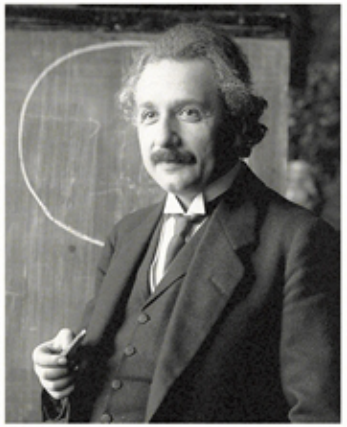
Max Karl Ernst Ludwig Planck

(April 23, 1858 – October 4, 1947)

Bosons

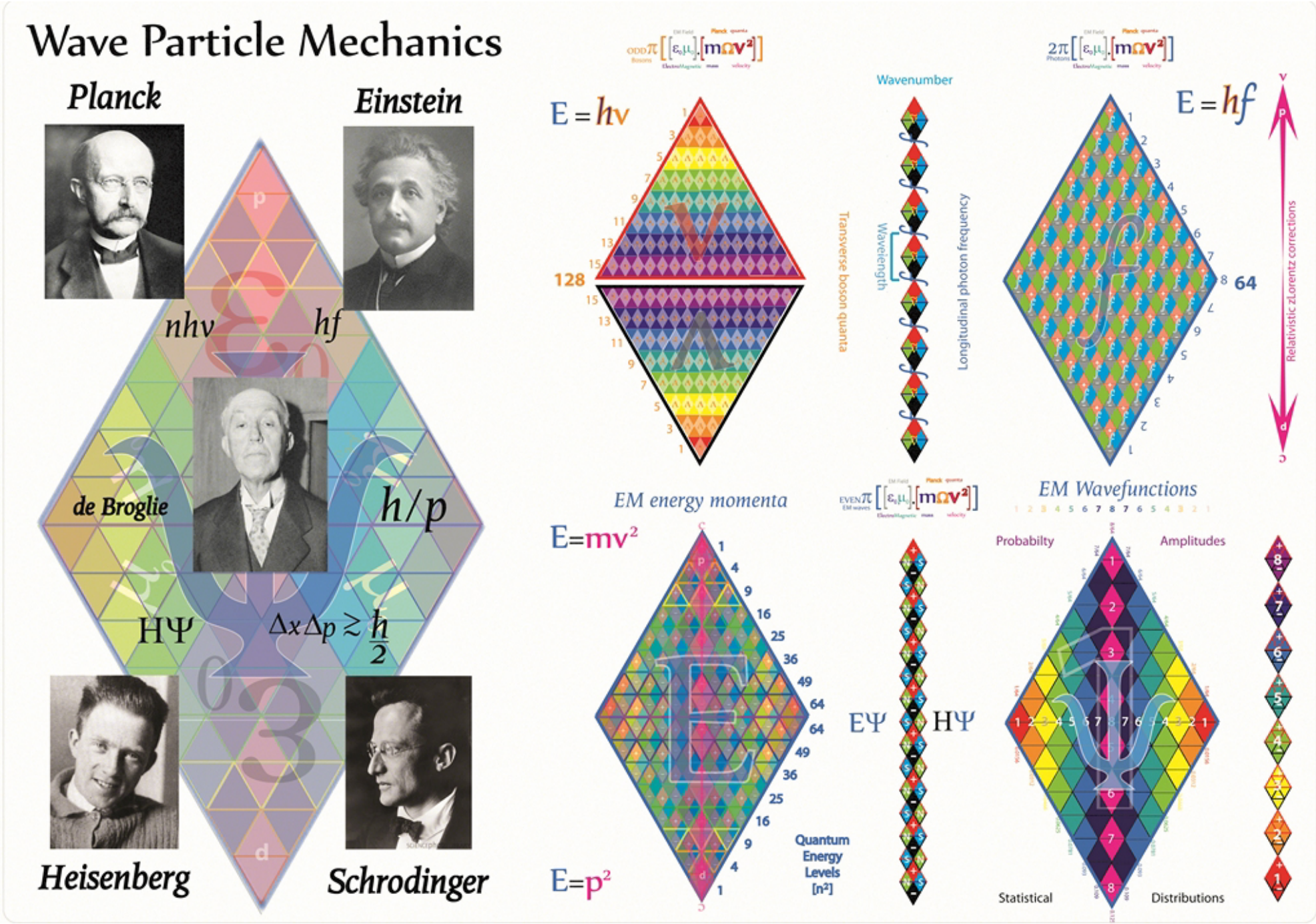
Photons

Albert Einstein



(14 March 1879 – 18 April 1955)

The quantum idea was soon seized upon to explain the photoelectric effect, and became part of the Bohr theory of discrete atomic spectra, quickly becoming part of the foundation of modern quantum theory in turn this led to the quantum wierdness of wave-particle dualty, Heisenberg's Uncertainty principle and Schrodinger's quantum wave equation & wavefunctions.

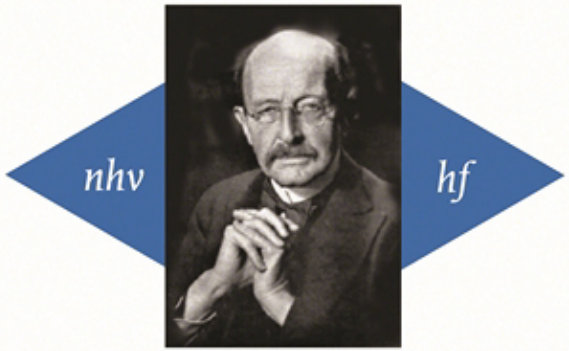


Blackbody Radiation

Wien's displacement law

Rayleigh–Jeans law

Max Planck

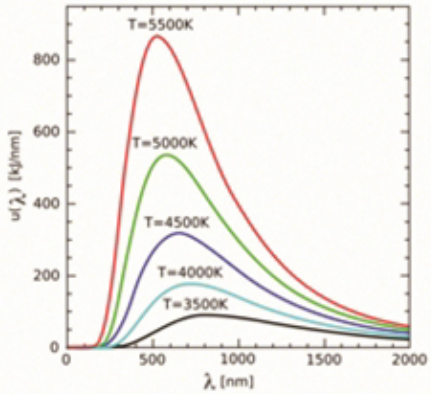


(April 23, 1858 – October 4, 1947)

In physics, Planck's law describes the amount of electromagnetic energy with a certain wavelength radiated by a black body in thermal equilibrium (i.e. the spectral radiance of a black body).

The law is named after Max Planck, who originally proposed it in 1900. The law was the first to accurately describe black body radiation, and resolved the ultraviolet catastrophe by introducing Planck's Constant.

It is a pioneer result of modern physics and quantum theory leading to mass.QAM being termed Planck's constant.

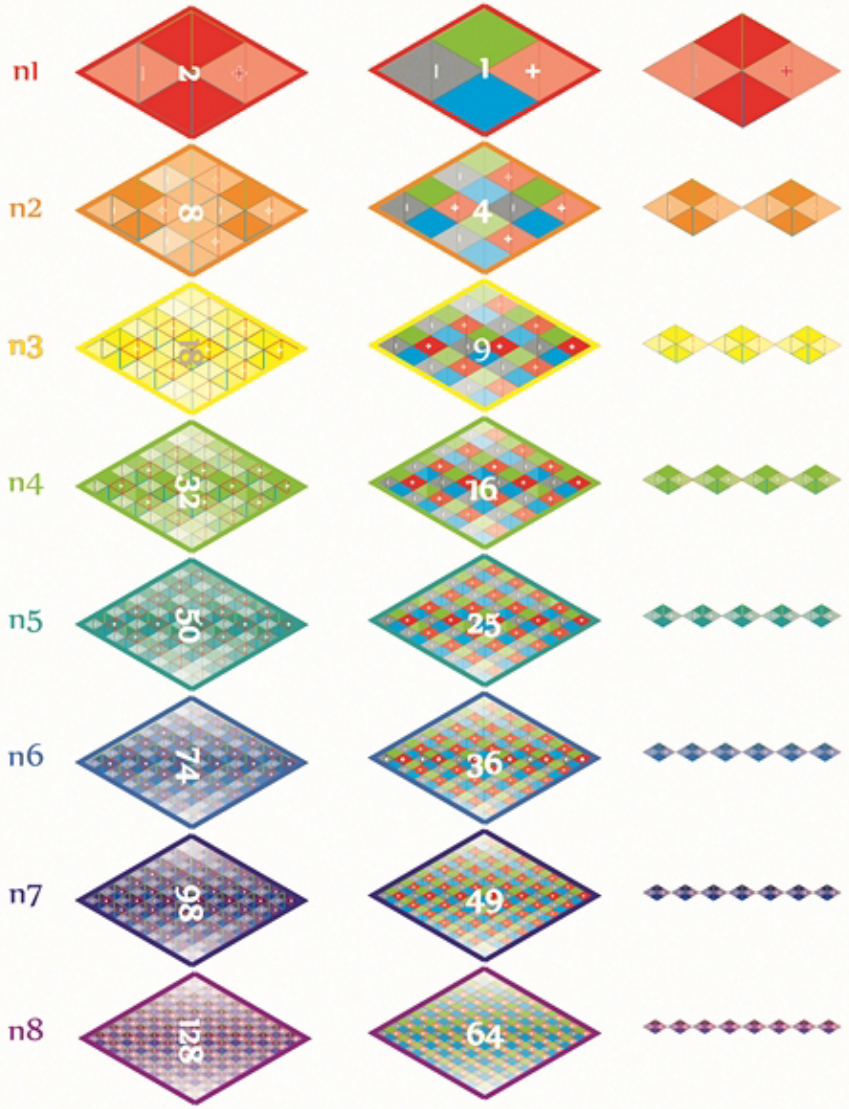


$m\Omega = 6.62943244\ e\text{-}34\ J.s = h$

nhv

All EM waves are comprised of discrete energy quanta

As their frequency increases the wavelength of emitted Photons decreases



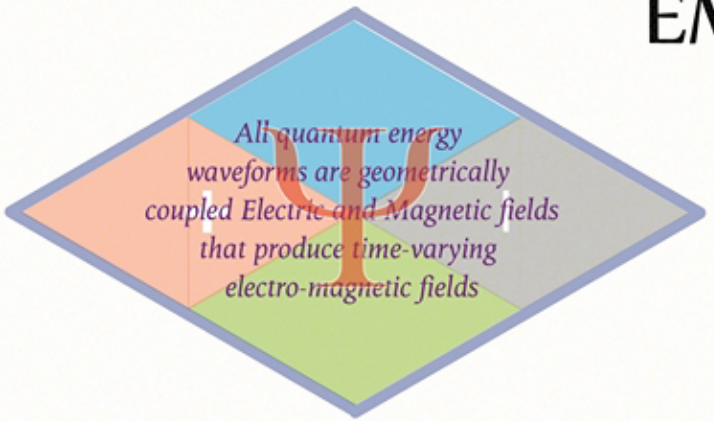
$2h\nu = hf = hc\tilde{\nu}$

EM field energies

$$E = n\pi\left[\left[m\Omega v^2\right]\right]$$

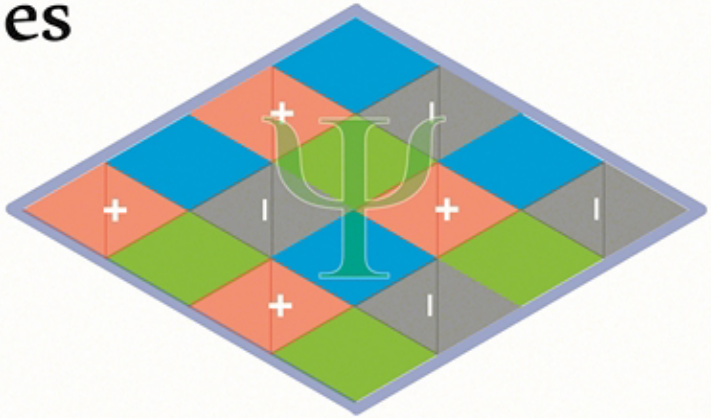
Planck quanta; mass; velocity

2hν

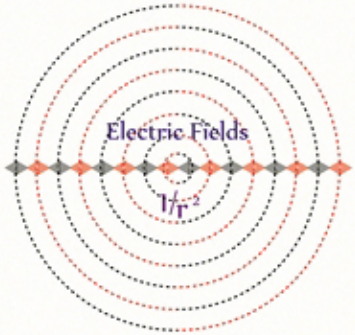


hf

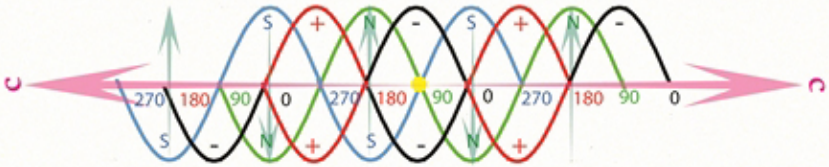
8 hν



4 hf



EM waves are subject to Lorentz co-ordinate transformations



EM waves are a quadrature waveform of bi-directional electromagnetic oscillations

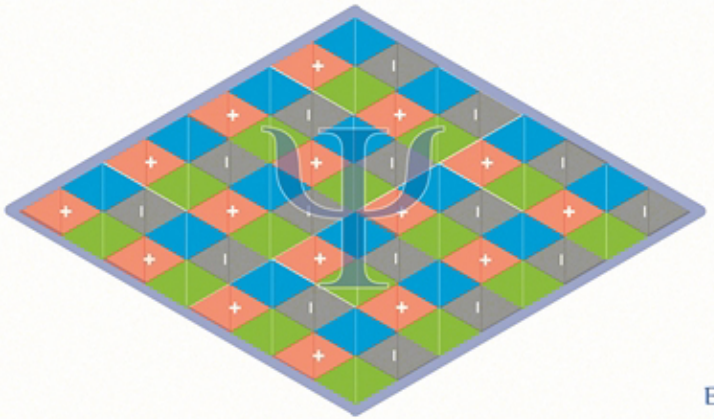
$$E = h\nu$$

$$E = hf$$

$$1\pi\left[\text{Charge}\right]\left[\left[\varepsilon_0\mu_0\right]_{\text{EM Field}}.\left[m\Omega v^2\right]_{\text{ElectroMagnetic mass}\ \text{Planck quanta velocity}}\right]$$

$$2\pi\left[\text{Photons}\right]\left[\left[\varepsilon_0\mu_0\right]_{\text{EM Field}}.\left[m\Omega v^2\right]_{\text{ElectroMagnetic mass}\ \text{Planck quanta velocity}}\right]$$

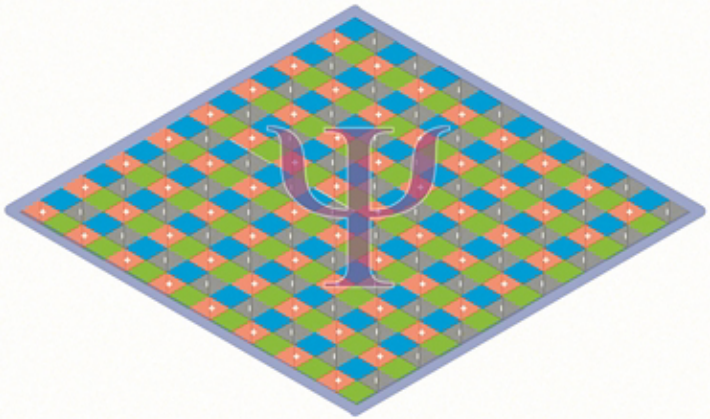
32 hν



16 hf

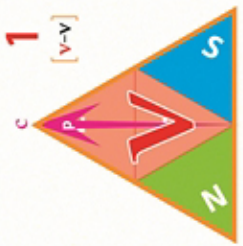
$$\text{EVEN}\,\pi\left[\text{EM waves}\right]\left[\left[\varepsilon_0\mu_0\right]_{\text{EM Field}}.\left[m\Omega v^2\right]_{\text{ElectroMagnetic mass}\ \text{Planck quanta velocity}}\right]$$

128 hν



64 hf

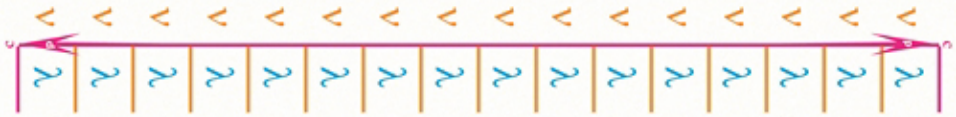
Bosons and Photons in EM waves

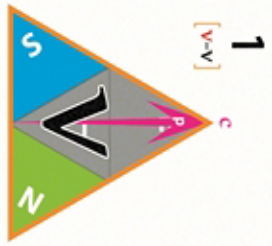


$$\text{ODD}\pi\ \text{Bosons}\ \left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta · ElectroMagnetic · mass · velocity

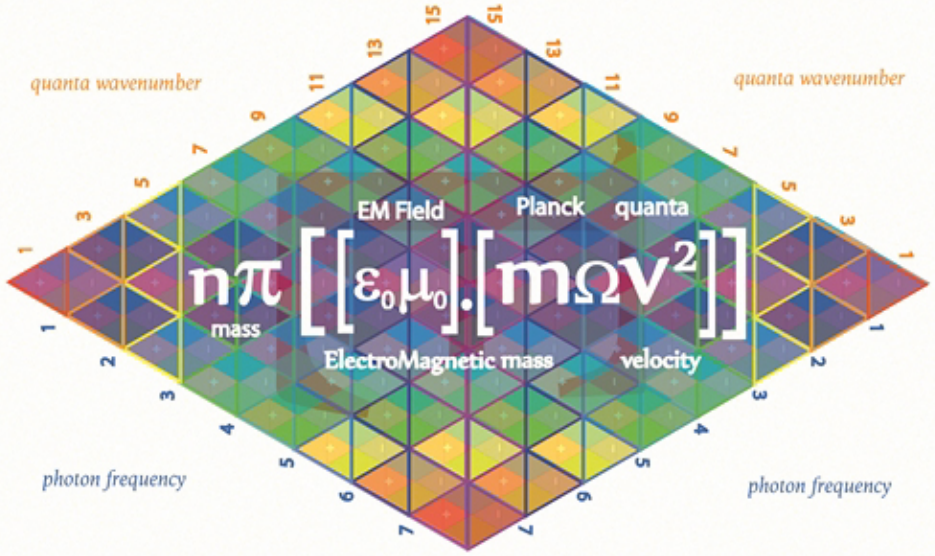
Transverse charge Quanta





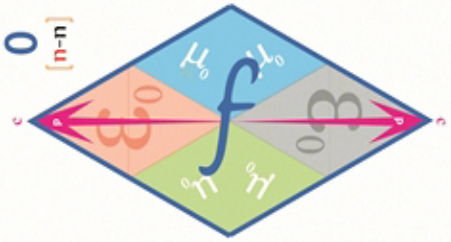
All EM waves are comprised of transverse Bosons

$$E = h\nu$$



$$E = hf$$

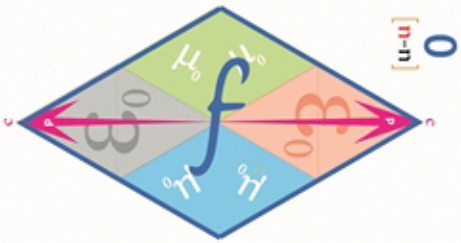
All EM waves are comprised of longitudinal Photons



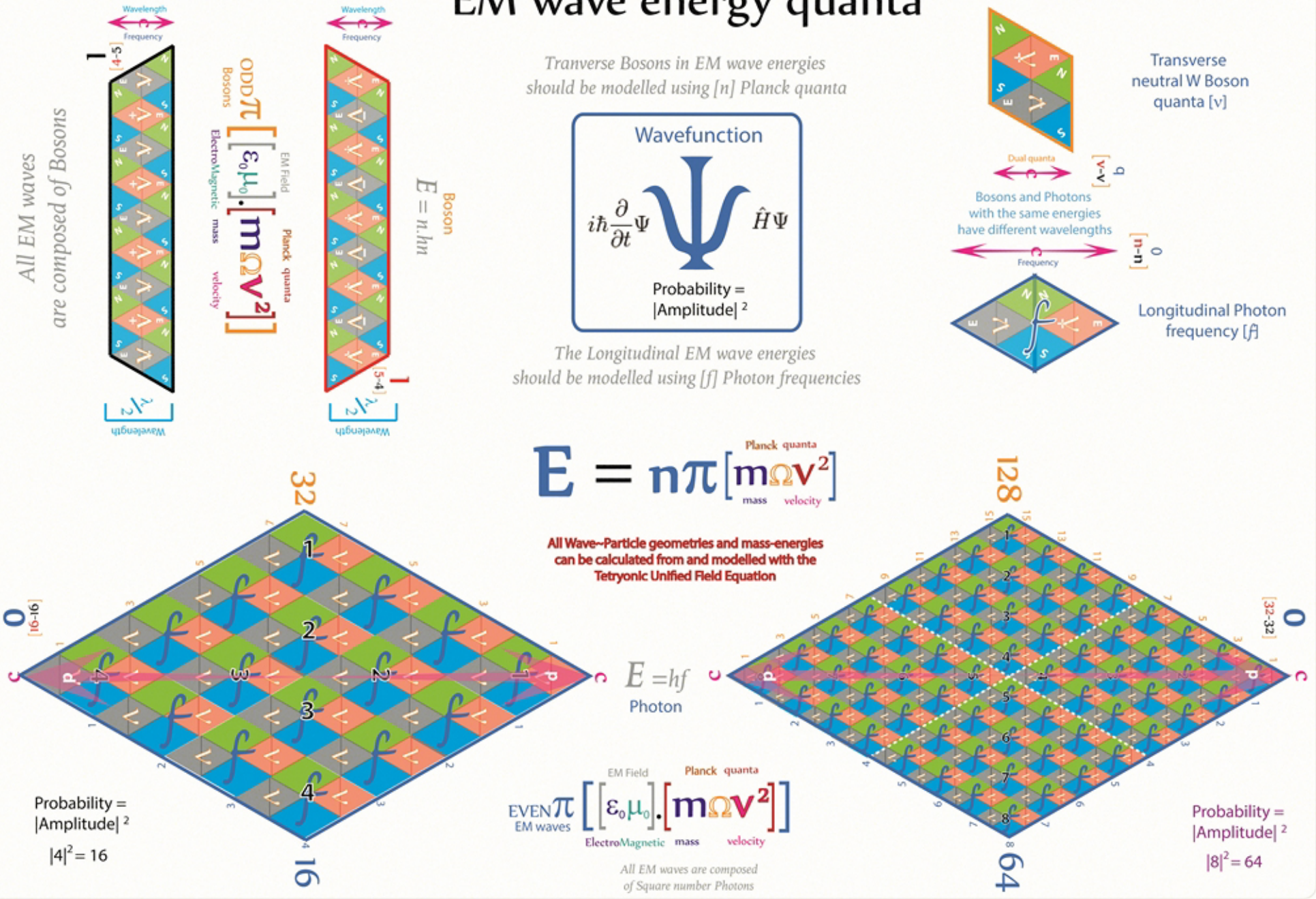
Longitudinal neutral Photons

$$\text{EVEN}\pi\ \text{Photons}\ \left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM Field · Planck quanta · ElectroMagnetic · mass · velocity



EM wave energy quanta



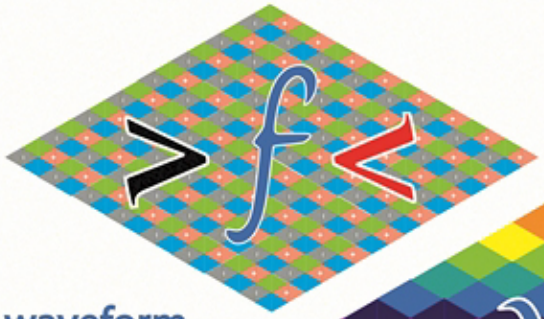
EM wave properties

Linear momentum is the square root of scalar mass-energies

$$\left[\sqrt{[m\Omega v^2]}\right]$$

Energy

mass quanta



EM waves are comprised of Photons with Kinetic energies, momenta and a photo-magnetic moment

EM waveform geometries

$$p_\gamma = 2\pi[[m\Omega v]]$$

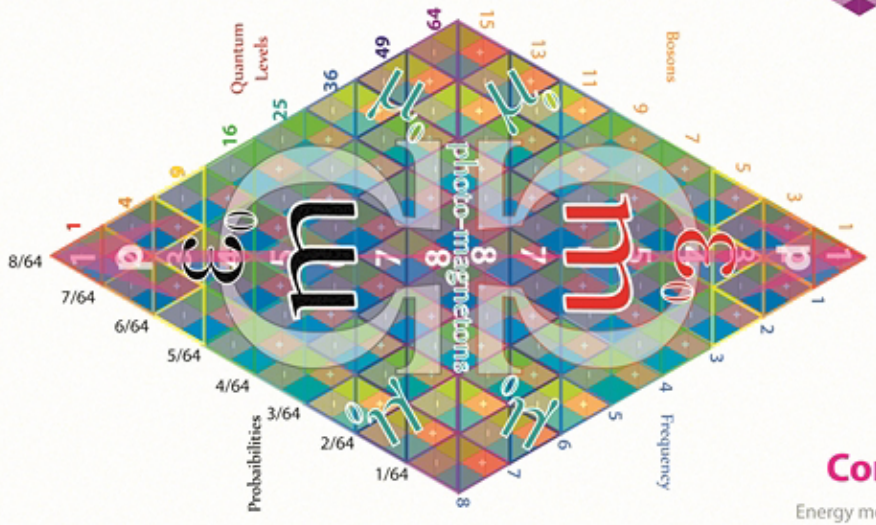
Energy

momenta

Photonic energy-momentum

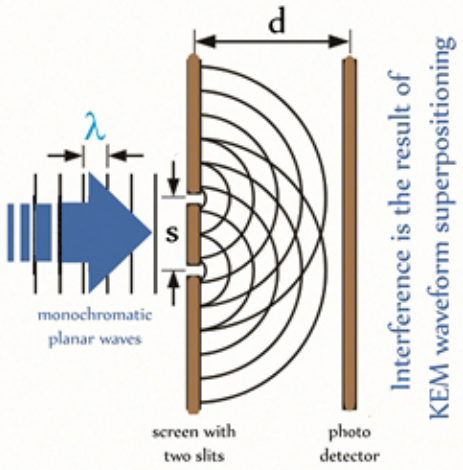
Transverse waveforms

Longitudinal waveforms



Scalar Planck quanta per second is the scalar source of all linear energy-momenta

$$p^2$$



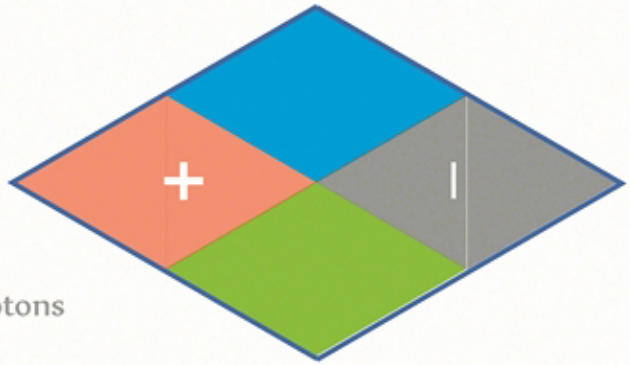
Conservation of Energy momenta

Energy momenta a conserved quantity in physical systems (laws of conservation), meaning that if a closed system is not affected by external forces, its total momentum cannot change

Statistical probabilities of energy distributions

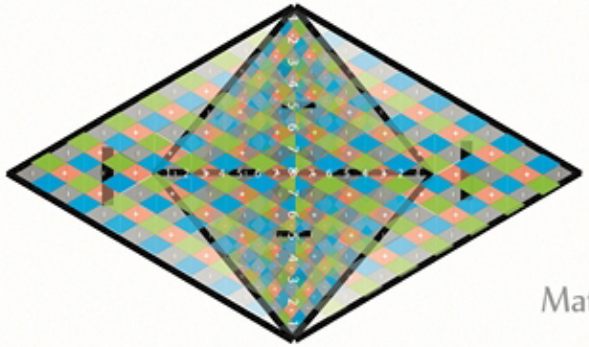
form the basis for quantum mechanical probabilities and wavefunctions

$E = 2mv$



Photons

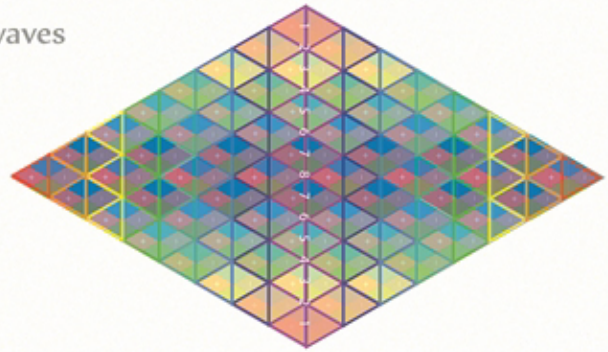
$E = Mc^4$



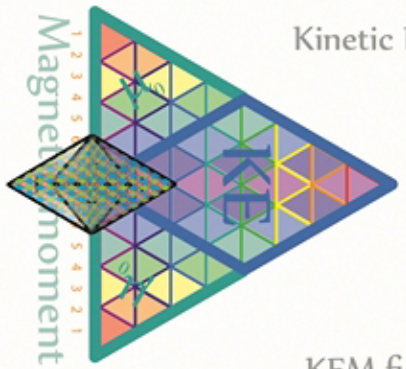
Matter

All ENERGY in motion has probabilistic distribtutions of energy quanta resulting from the equilateral Tetryonic geometries of electromagnetic mass-ENERGY-Matter

EM waves



$p^2 = E = mv^2$

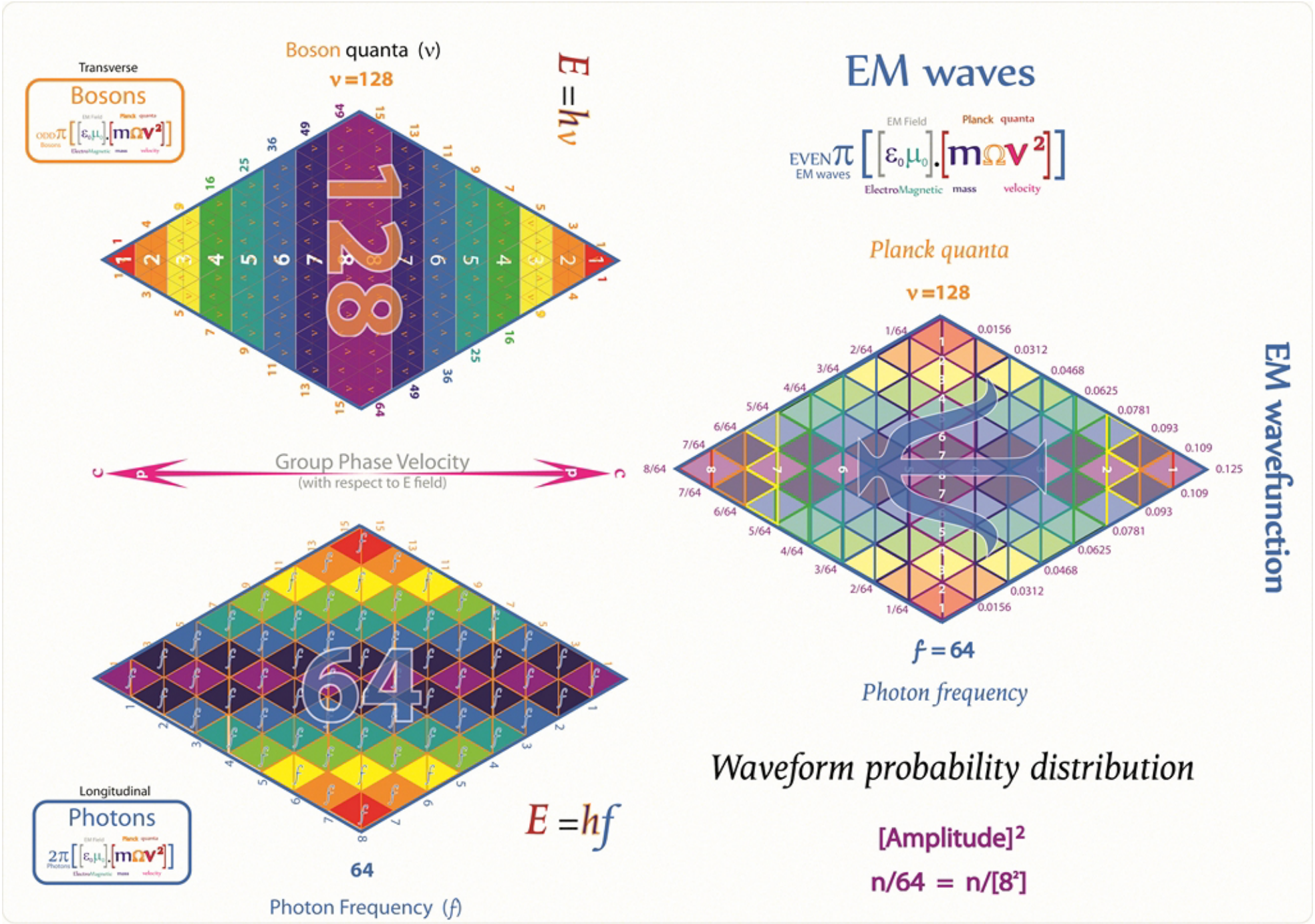


Kinetic Energies

$KE = \frac{1}{2}Mv^2$

KEM fields

$Mv^2 = KEM$

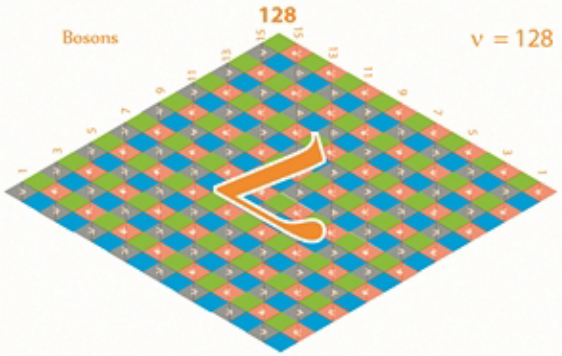


Wave functions

All EM waves and Photons exhibit quantum levels of mass-energy momenta determined by their constituent bosons

Transverse EM Waveforms

Bosons



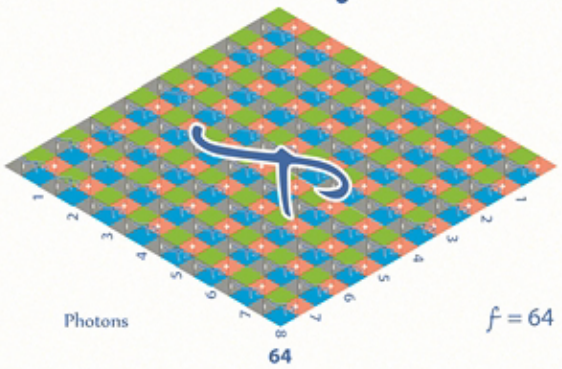
$E = h\nu$

[Planck quanta are single-quanta Bosons]

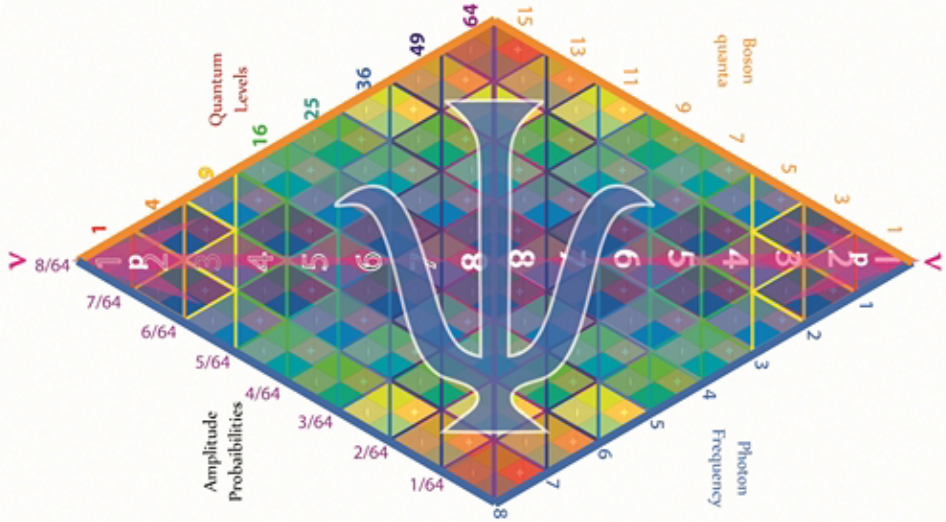
All EM waves are comprised of Longitudinal Photons which in turn are made up of Transverse Bosons

[Photons are neutral dual-quanta Bosons]

$E = hf$



Photons



Longitudinal EM waveforms

All electromagnetic waves exhibit wave probabilities and amplitude functions determined by their constituent photons

Energy levels

Squared numbers

Wave-particle duality holds that light and matter simultaneously exhibit properties of waves as well as particle-like properties (photons).

This concept is a consequence of the mathematical treament of mass-energy physics in quantum mechanics and a comprehensive explanation of this duality has been elusive to Physics since its discovery.

Any attmpt to develop an unified quantum theory must explain the root cause and processes behind Wave-Particle duality and must also explain:

Diffraction, Deflection and Reflection along with Bosons, Photons, EM radiation, energy quantisation and mass-Matter.

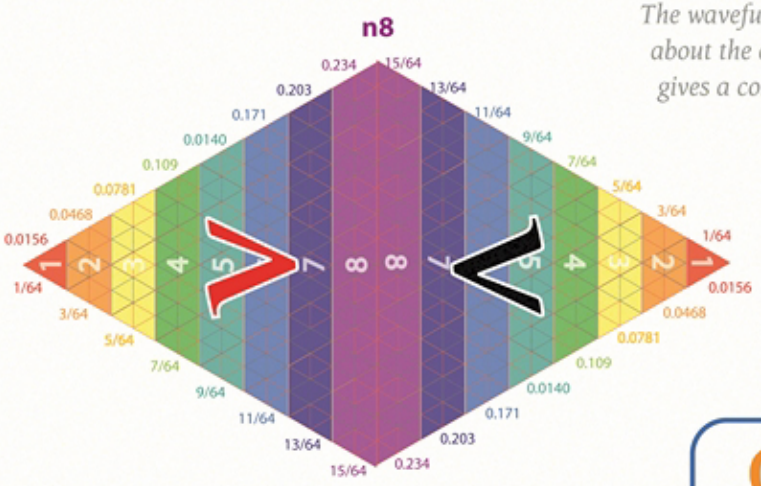
Probabilities

Waves

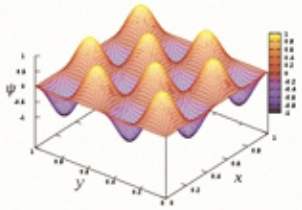
EM Wavefunctions

The wavefunction for a system contains all the information about the quantum state that a particle/system is in and gives a complete description of that part of the world at any one particular instant in time.

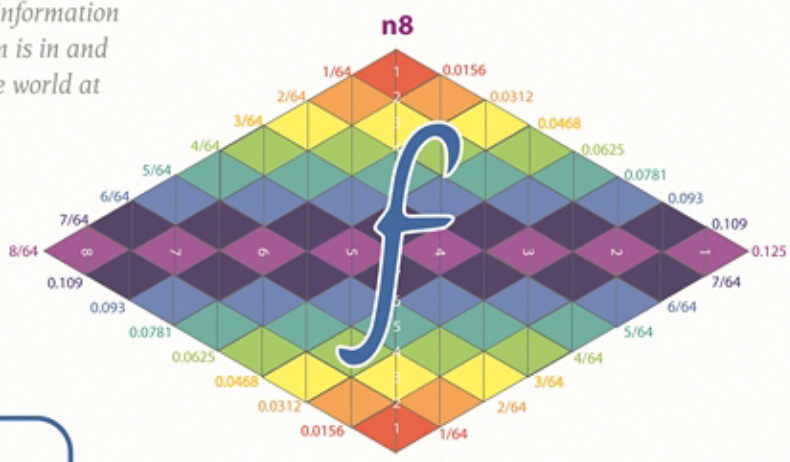
Transverse mass-energy distrbutions



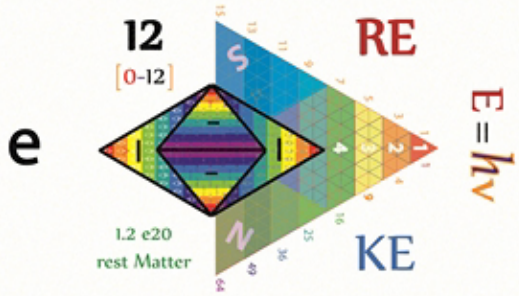
ν = 128

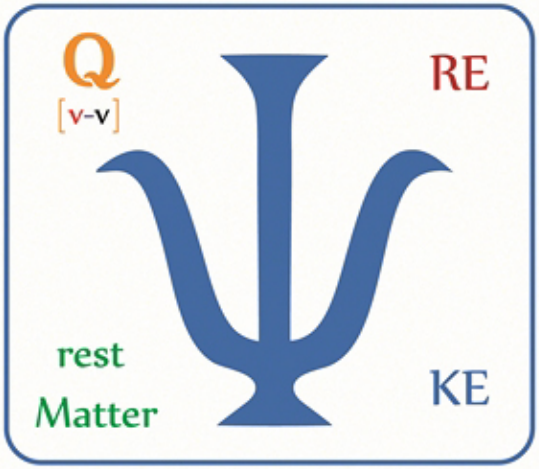


Longitudinal mass-energy distributions



f = 64

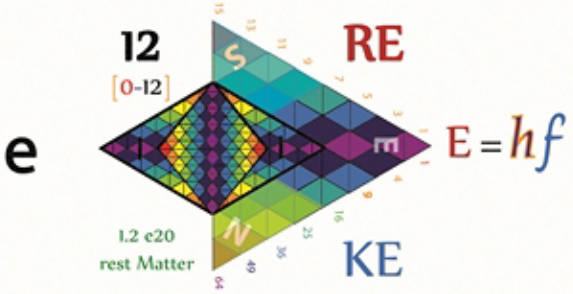




The wavefunction of an EM wave (KEM) geometry is distinct from that of rest mass-Matter toplogies due to the number of Planck quanta contained in it but both can be modelled using Tetryonic geometry

$$\int_{-\infty}^{\infty} |\Psi|^2 dx = 1.$$

The absolute square of the function must be normalizable



Quantum Energy Levels

The wavefunction itself is often said to be un-observable. In fact, it can modelled as it is a reflection of the quantas making up the quantum state of any particle and is complex-valued.

As the system evolves over time, the wavefunction also changes, so it can be written as a function of time Ψ(t).

Wave-Particle Probabilities

The absolute square of the wavefunction is a probability density (the area of highest probability for a measurement to take place.

For example, if the wavefunction is expressed in real space and our system is a particle, the absolute square gives a probability density for the position of the system. Integrating this probability density between some bounds will give the probability that the particle will be found in that region when its position is measured

Wave~Particle energies

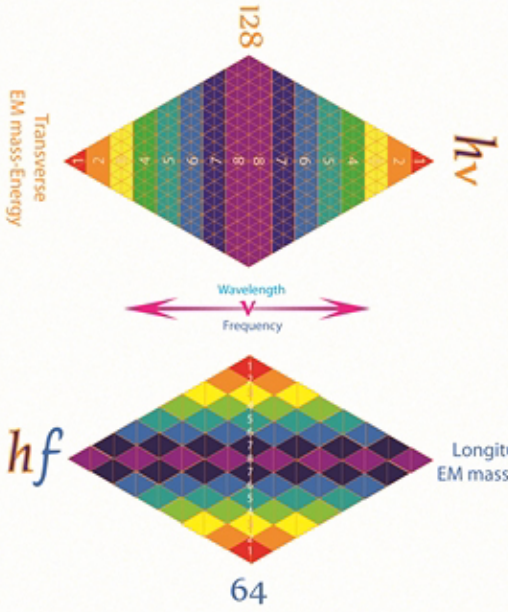
Equilateral energy is the foundational geometry
of Kinetic EM Waveforms [WAVES]
and standing wave Matter [PARTICLES]

All Matter in motion exhibits a Wave-Particle duality

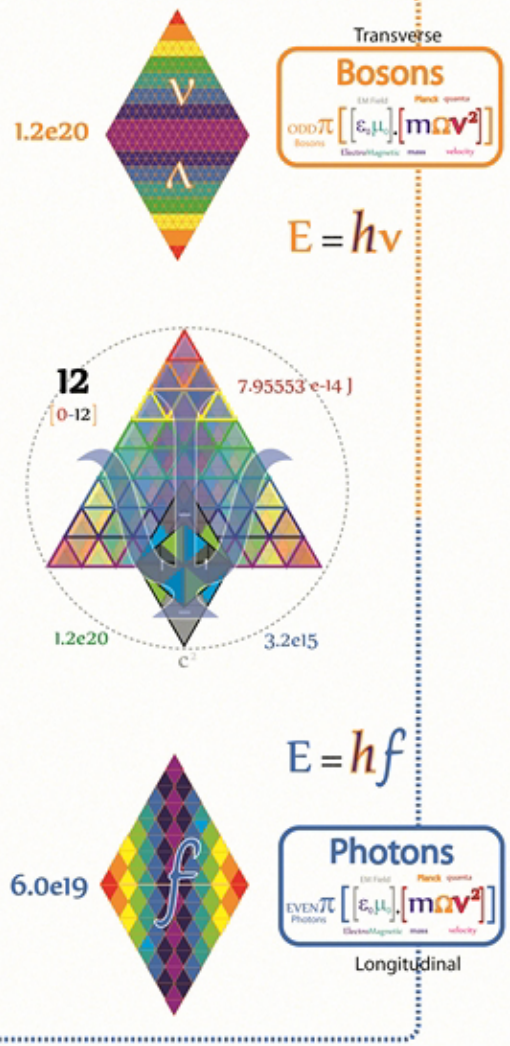
Everything is made up of
charged mass-energy quanta

ZPFs combine in ODD numbers to form
Bosons

Bosons combine to form
Quantum Levels

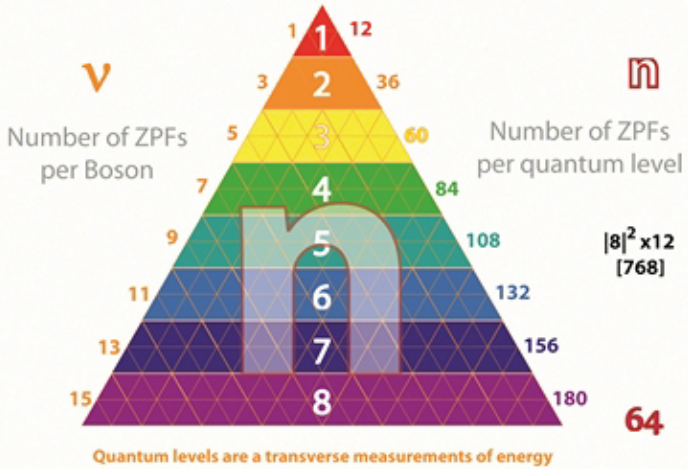


The quantum Planck quanta tesslation
of Matter can be accurately modelled with
Wave Probability mechanics



A n8 Electron is a massive particle
which has a Kinetic EM energy field
[6.4e15 planck quanta]

2D EM field geometries
can combine to form
3D Tetryonic Matter topologies



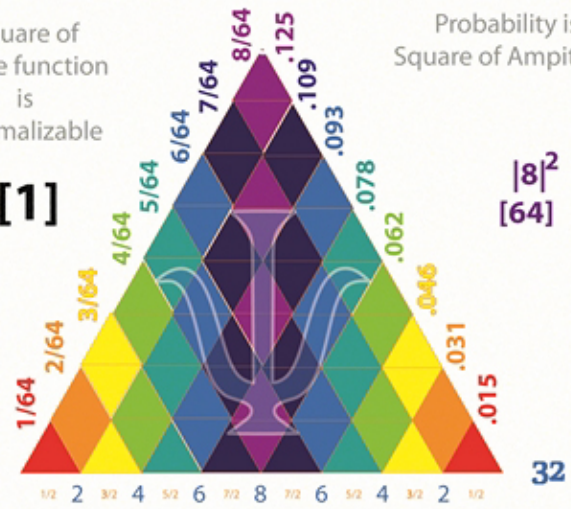
Equivalently, all Matter & EM waves can be viewed either in terms of their transverse boson or longitudinal photon content and/ or their associated mass-energy momenta geometries

Square of
Wave function
is
Normalizable

[1]

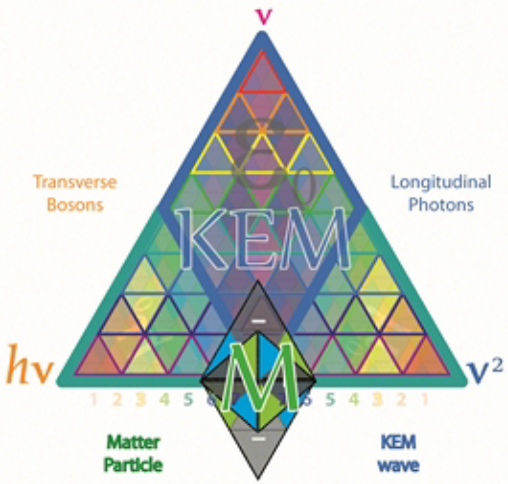
Probability is
Square of Ampitude

|8|²
[64]

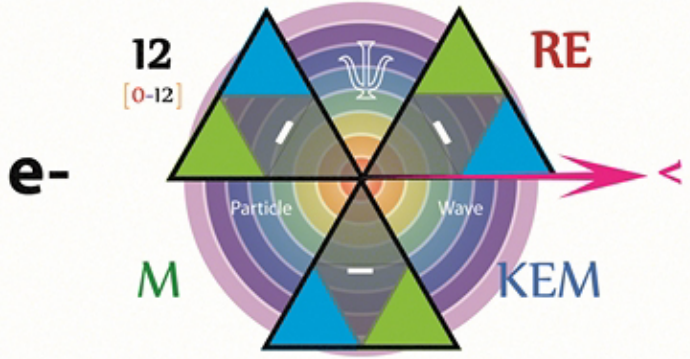


Wave-particle Probabilities

All Particles in motion exhibit a Wave-Particle duality
due to the 2D waveform geometry of its KEM wave
and the lorentz velcoity invariant
3D standing wave geometry of its Matter

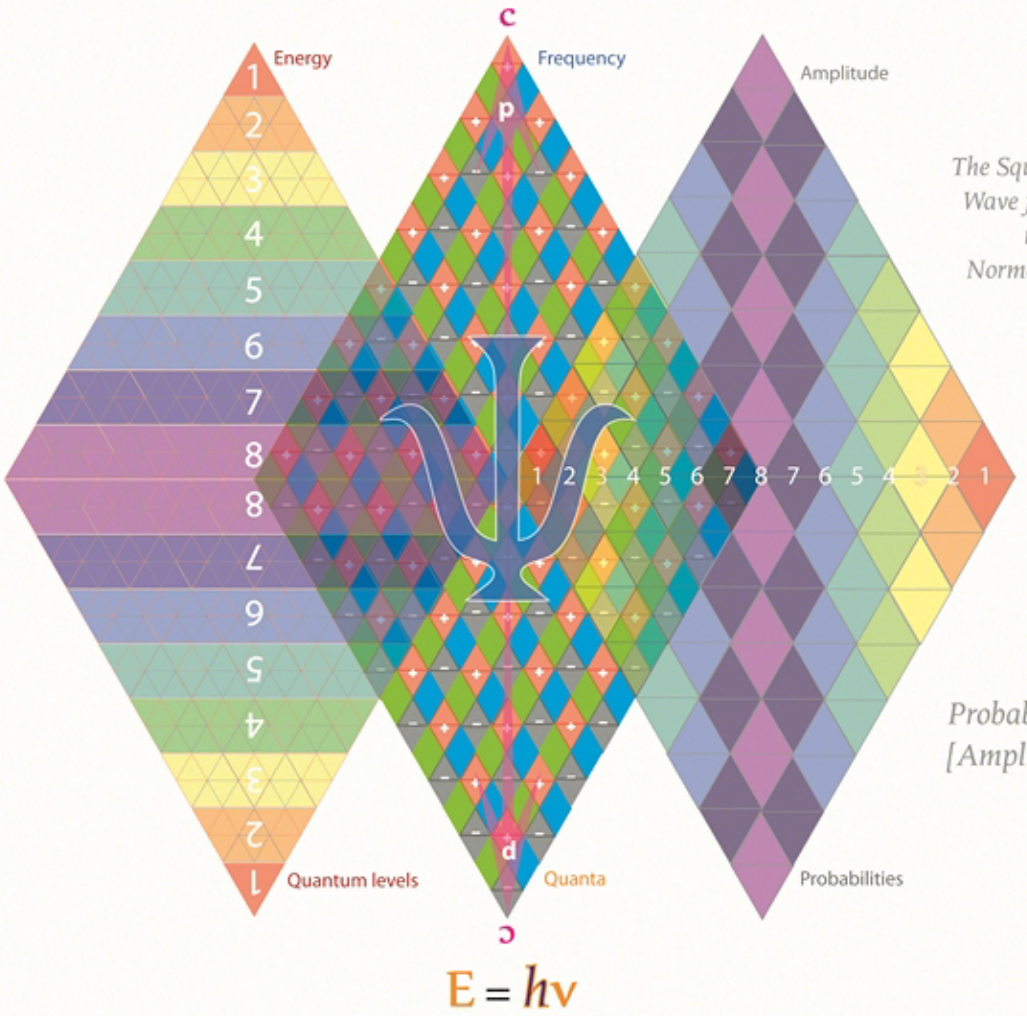


Equilateral energy tessellation
provides the basis for the probabilistic
statisical mechanics and math for
all of Quantum Mechanics



Schrodinger Wavefunction
The Wavefunction of a Particle
equates to its Amplitude

$E = hf$

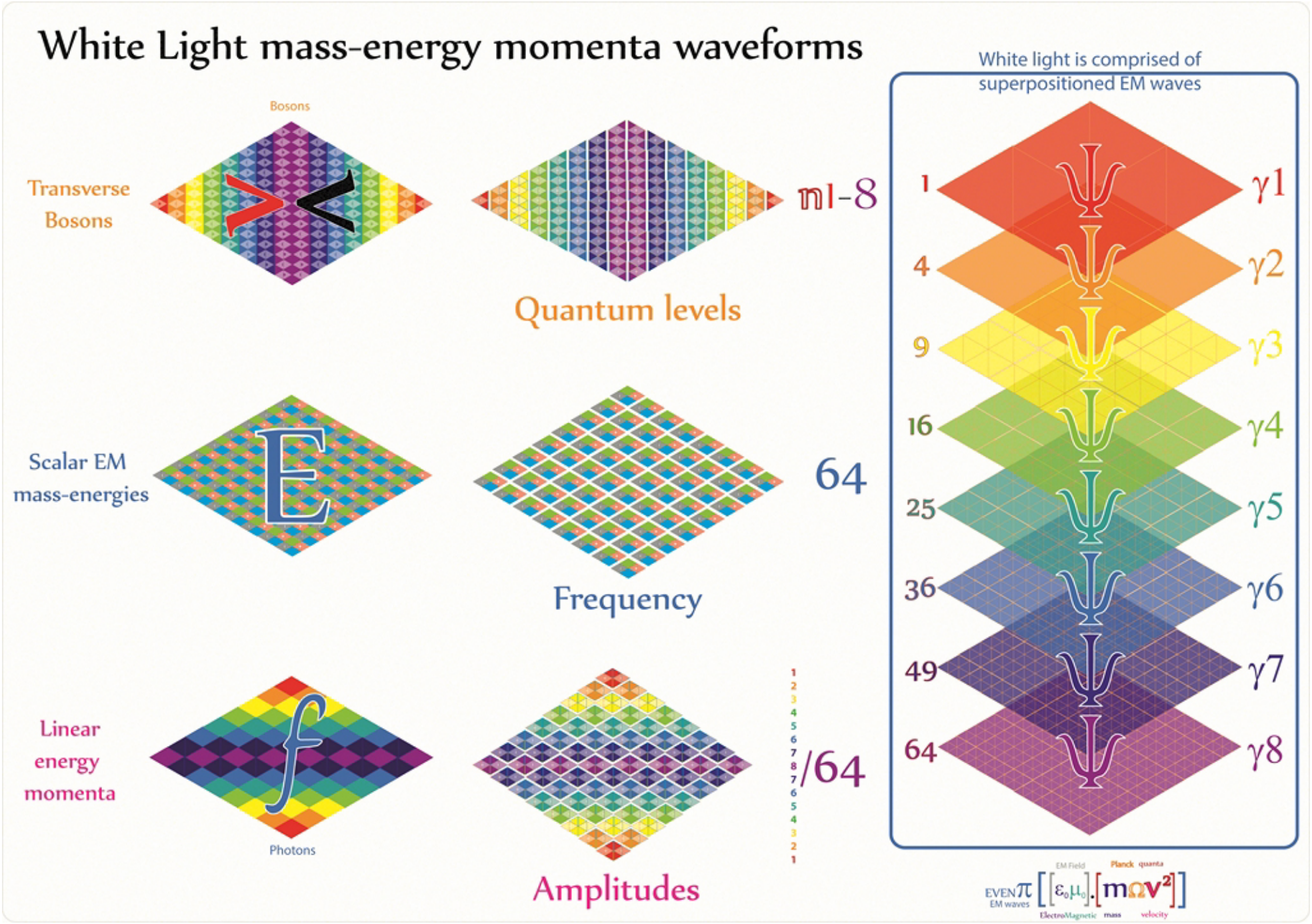


The Square of a Wave function is Normalizable

Probability = [Amplitude]²

$E = hv$

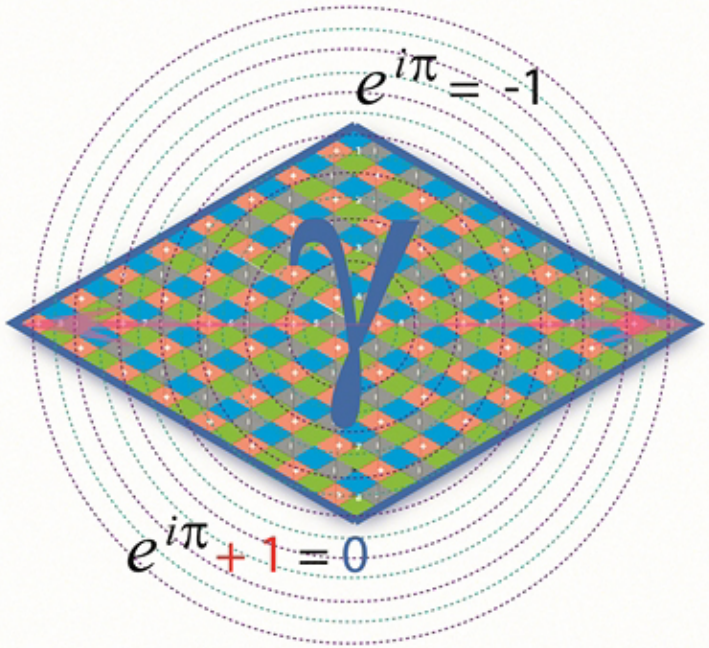
Born Probability Rule
The Probability of finding a Particle
is the Square of its Amplitude



Bosons and Photons

EM waves are comprised of longitudinal [E=hf] Photons which in turn can also be measured as transverse [E=nhv] Bosons

Electro-Magnetic Fields



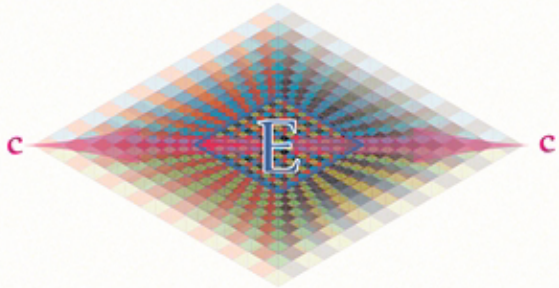
As described by Lorentz co-ordinate transforms the neutral quantum coin [quoin] geometry of all photons and EM waves have mirror E-field charges on each of their opposing fascia

2D planar mass-energy momenta waveforms

$$2\pi \text{ Photons } \left[\left[\varepsilon_0 \mu_0 \right] . \left[m \Omega v^2 \right] \right]$$

EM Field — Planck quanta — ElectroMagnetic — mass — velocity

Photons and EM waves have dual c^2 space-time geometries
(8.987551787 e16 m /s)

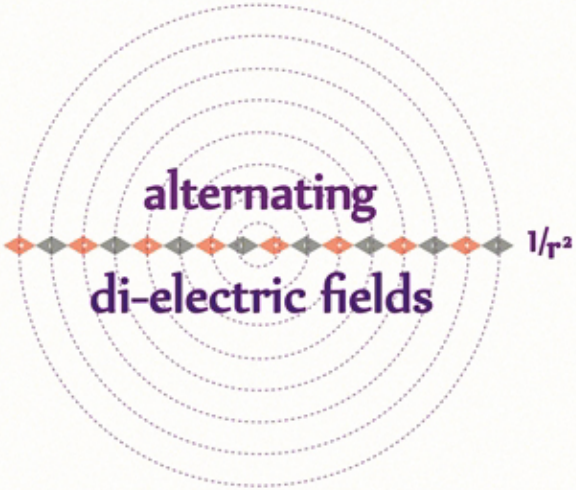


Photons and EM waves propagate outwards from their source at 'c'
(299,792,458 m/s)

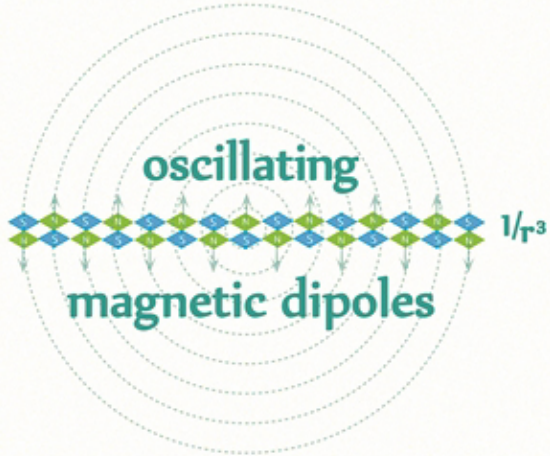
$$\text{EVEN } \pi \text{ EM waves } \left[\left[\varepsilon_0 \mu_0 \right] . \left[m \Omega v^2 \right] \right]$$

EM Field — Planck quanta — ElectroMagnetic — mass — velocity

EM waves are detected as alternating radial electric E-wave radiation fields



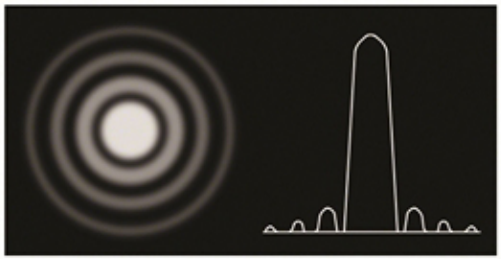
EM wave radiation

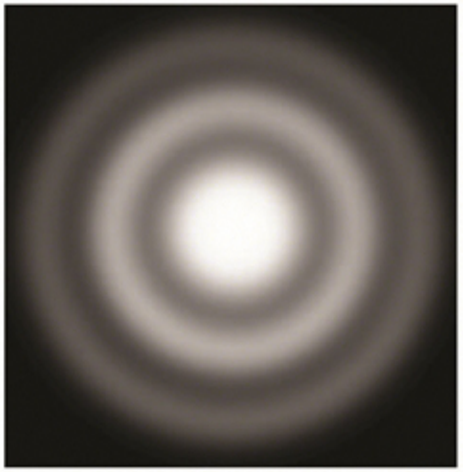


The Magnetic vector of EM energy momenta propagate orthagonally to their E-fields

EM wave patterns

Polarised Photons and EM waves produce linear interference patterns

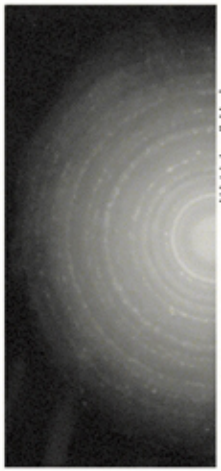


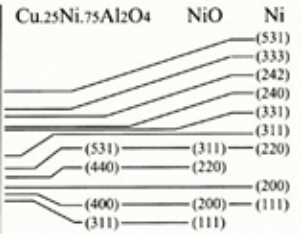


Diffraction occurs whenever propagating waves appear to bend around small obstacles in their path and spread out as smaller waves waves past any openings, its effects are generally most pronounced for waves whose wavelength is roughly similar to the dimensions of the diffracting objects.

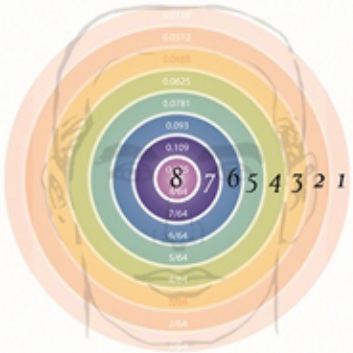
If the obstructing object provides multiple, closely spaced openings, a complex pattern of varying intensity can result.

This is due to the superposition, or interference, of different parts of a wave that travels to the observer by different paths



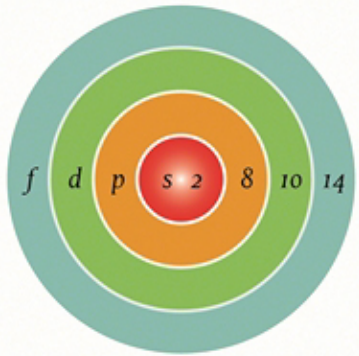


atomic diffraction spectroscopy of matter plays an important role in the chemical analysis of elements and compounds



Diffraction occurs with all waves, including sound waves, water waves, as well as with electromagnetic waves such as visible light, X-rays and radio waves.

Un-Polarised Photons and EM waves produce circular diffraction patterns



Richard Feynman once commented that:
"No-one has ever been able to define the difference between interference and diffraction satisfactorily. It is just a question of usage, and there is no specific, important physical difference between them."

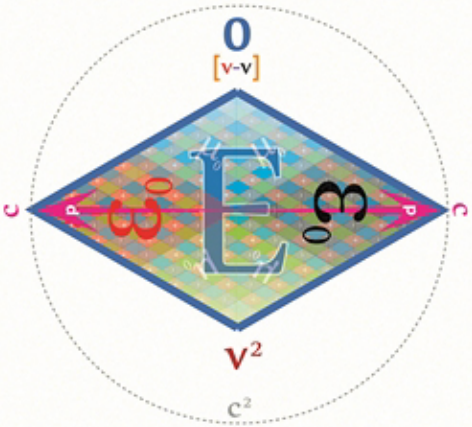
Light waves

Thomas Young

(13 June 1773 – 10 May 1829)

In order to establish his wave theory of light Young had to overcome the century-old view, expressed by Sir Isaac Newton' in his treatise "Optics", that light is a particle of colour.

Thomas Young studied the interference of light waves by shining light through a screen with two slits equally separated, where the light emerging from the two slits would spread out and eventually superposition [overlap] each other to produce a distinct interference pattern

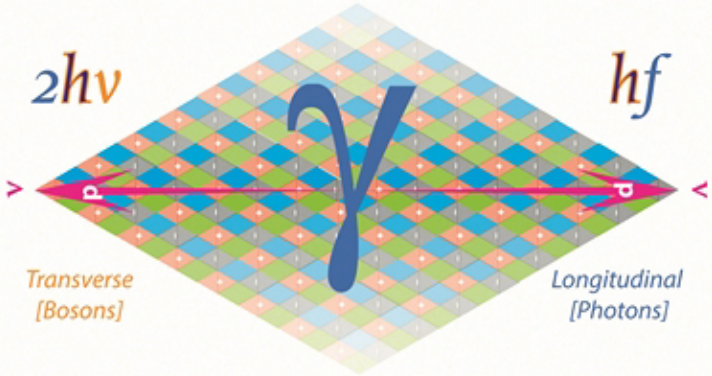


$$E = mv^2$$

"The term energy may be applied, with great propriety, to the product of mass or weight of a body, into the square of the number expressing its velocity.

Thus, if the weight of one ounce moves with a velocity of a foot in a second, we call its energy 1; if a second body of two ounces has a velocity of three feet in a second, its energy will be twice the square of three, or 18."

$$KE = \frac{1}{2}Mv^2$$

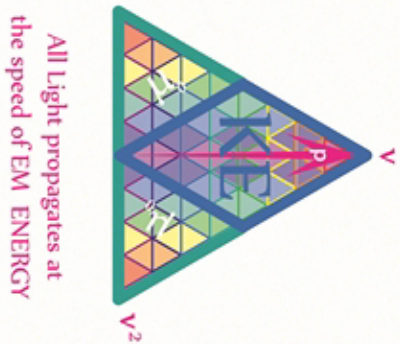


$$E_\gamma = 2mv^2$$

Photons are radiative Kinetic EM mass-energies

$$p^2 = KEM = Mv^2$$

All EM waves have energy momenta geometries whose physical properties can be modeled with statisical probabilities due to their equilateral wavefunctions



Tetryonics reveals the true geometry of Light

and dispels the misconceptions surrounding its physical properties of wave-length, energy momenta, frequency and associated wave-function

Photon-EM Wave Superpositioning

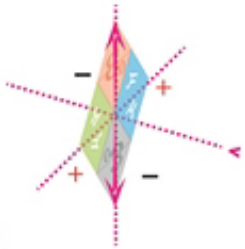
In physics, the Superposition principle, also known as superposition property, states that, for all linear systems, the net response at a given place and time caused by two or more stimuli is the sum of the responses which would have been caused by each stimulus individually.

$$F(\psi_1+\psi_2)= F(\psi_1) + F(\psi_2)$$

Positive quantum charge state is one side of the quantum energy momenta quoin

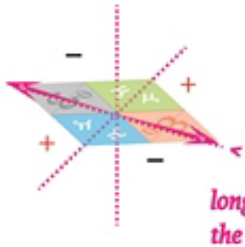
Negative quantum charge state is the other side of the quantum energy momenta quoin

The linear momenta of transverse waves is orthagonal to the direction of wave propagation



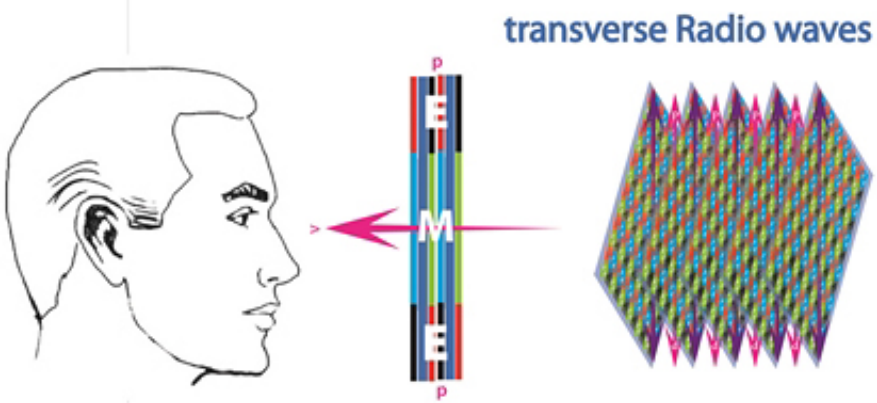
Photons are neutral EM wavepackets

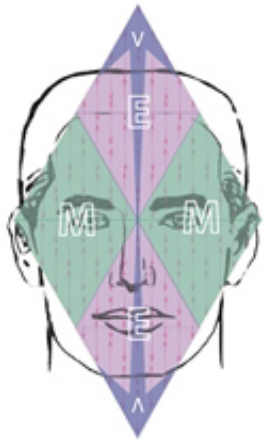
whose chiral quantum charges can be determined through Lorentz co-ordinate transformations



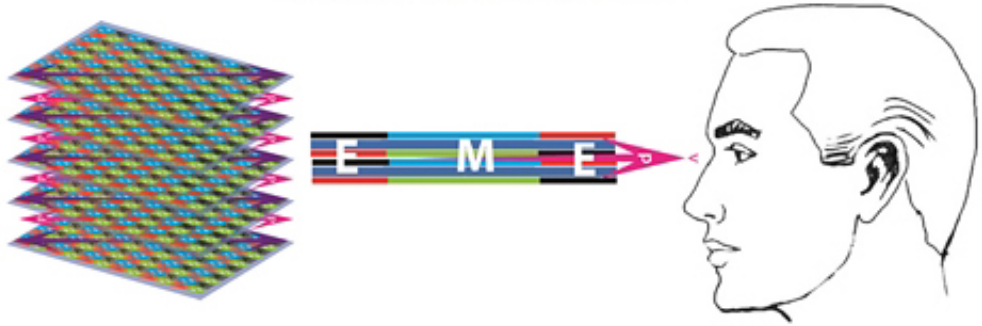
The linear momenta of longitudinal waves is co-linear to the direction of wave propagation

transverse Radio waves





longitudinal Spectral lines

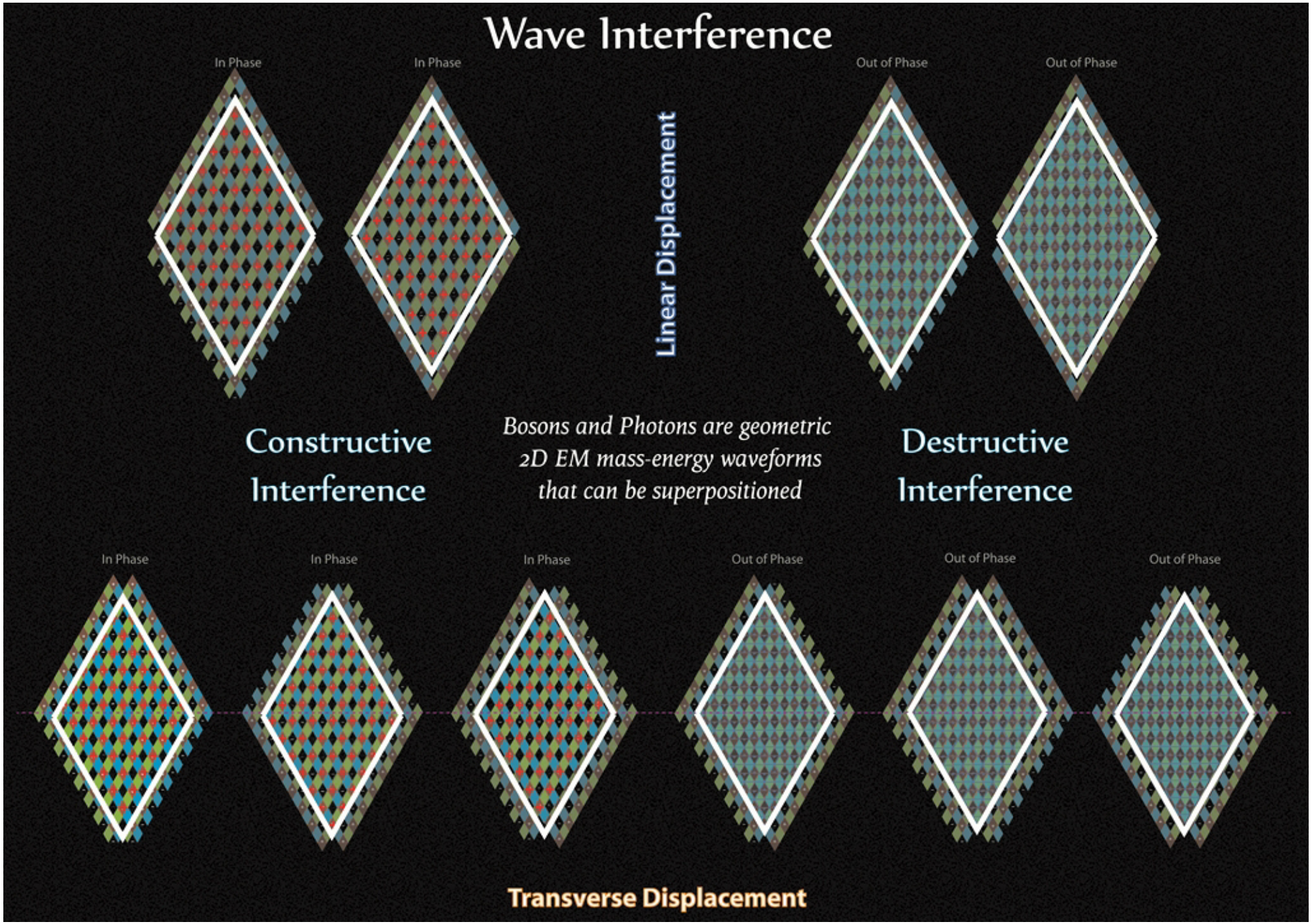


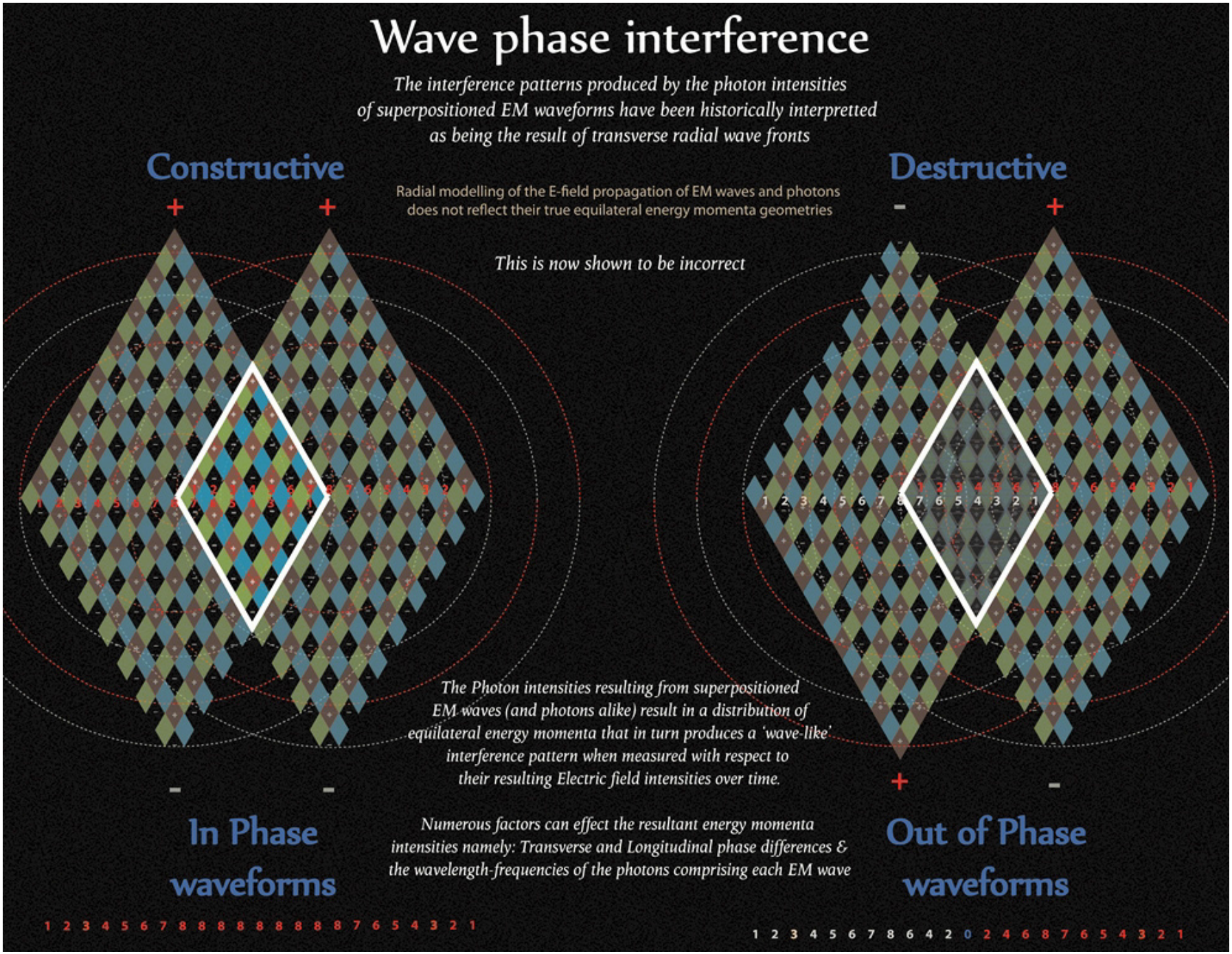
$mc^2{}^2$ *Superpositioned EM waves can be likened to the cells of a chemical battery* mv^4

E^2

p^4

It is the superpositioning of longitudinal EM waveforms that creates white light and linear interaction-at-a-distance forces





Matter in motion

Transverse EM mass-energies

$E = h\nu$

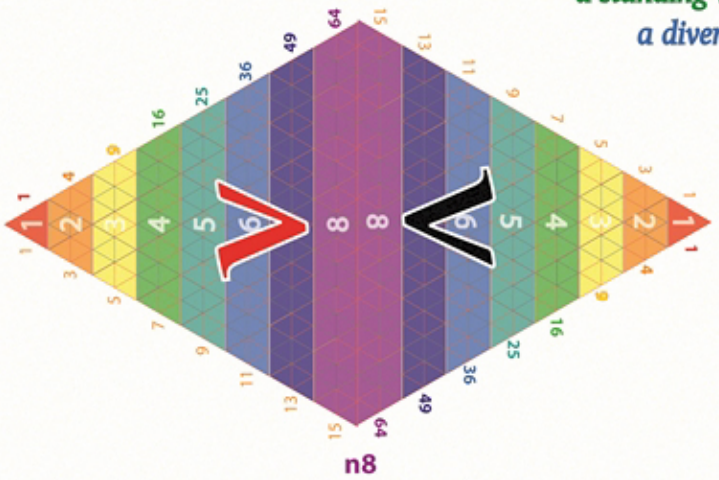
Longitudinal EM mass-energies

$E = hf$

Historically modeled through relativistic stress energy tensors all Matter in motion is possessive of distinct energy waveforms:

a standing wave mass-energy geometry [Matter particle] & a divergent kinetic mass-energy field [KEM wave]

$T\mu\nu$



EM induction and forces are effected by neutral bi-directional KEM mass-energy fields with interactive energy momenta

Negative charges in motion

unidirectional negative KEM fields with interactive energy momenta

electromagnetic waves

[neutral bosons and/or photons]

Positive charges in motion

unidirectional positive KEM fields with interactive energy momenta

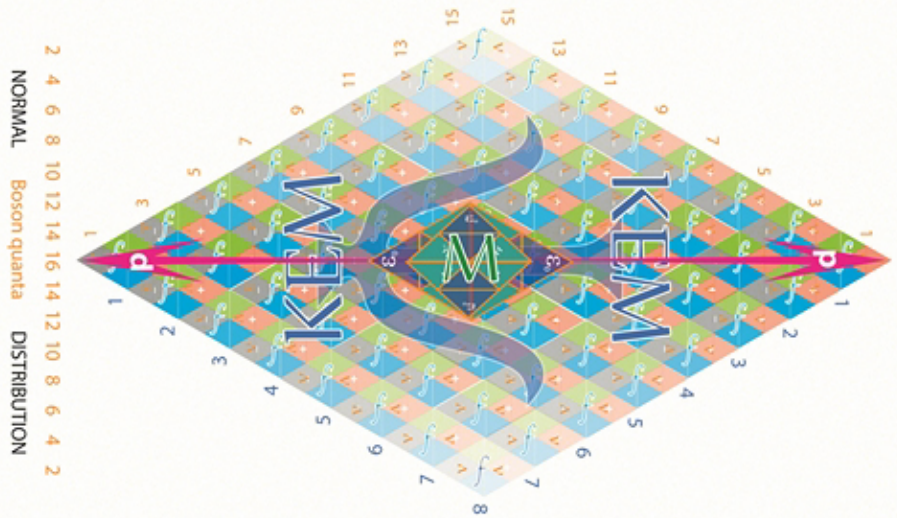
All Matter in motion [or not]
has both an intrinsic Matter-wave function
and an extrinsic KEM mass-energy wave function

Transverse boson wavefunction

$$\text{ODD}\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right] \qquad E = n.hv$$

EM Field · Planck quanta · Bosons · ElectroMagnetic · mass · velocity

128



$$\text{EVEN}\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right]$$

EM waves · EM Field · ElectroMagnetic · mass · velocity · Planck quanta

64

$$2\pi\left[\left[\varepsilon_0\mu_0\right].\left[m\Omega v^2\right]\right] \qquad E = hf$$

Photons · EM Field · Planck quanta · ElectroMagnetic · mass · velocity

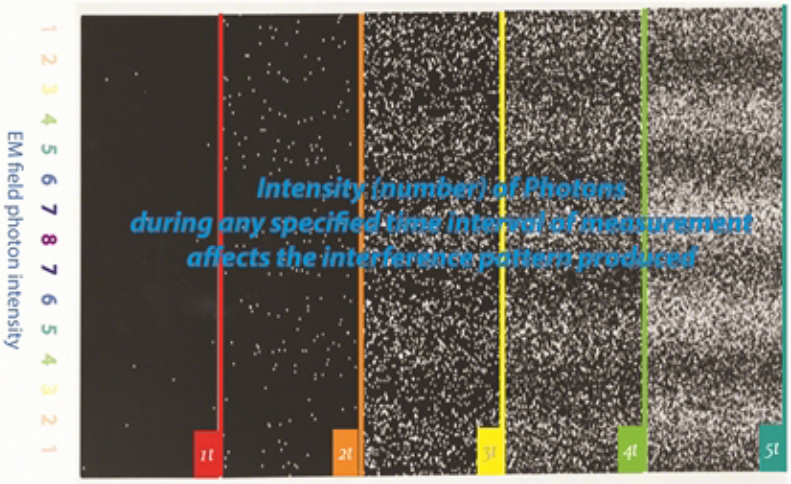
Longitudinal photon wavefunction

Photon Intensity

Photon Intensity is a result of the geometry of EM waves [which in turn is directly proprtional to the velocity of the mass-Matter] and can be measured in a number of vaying ways related to the mass-energy momenta of the EM wave

Wavenumbers, frequency or wavelength
Transverse EM masses [BOSONS]
Longitudinal EM masses [PHOTONS]
Wavefunction probabilities [WAVE-FUNCTIONS]

The wave~particle nature of mass-Matter in motion has been the subject of much debate since Lucretius in 55BC with the debate intensitying with Newton's and Young's differing views and the development of Planck-Einstein quantum mechanics of the photo-electric effect



The measurement of Photons with the use of Photo-multipliers and Charge coupled Devices results in the measurement of the E field properties of EM waves (producing the long confusing wave-particle results obtained by diffraction gratings)

In turn these results have been historically misinterpreted as a waveform property that cannot be attributed to the particle properties of a Photon.

Tetryonic geometry clears this matter up once and for all.

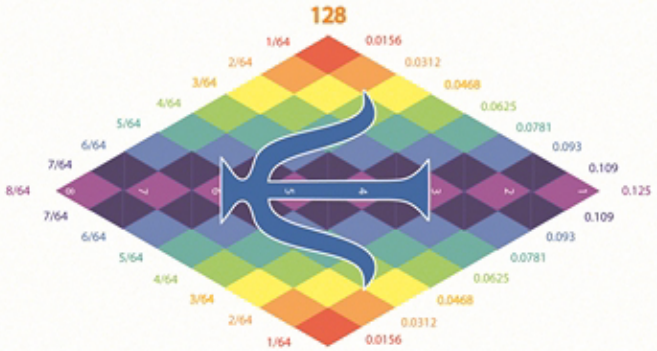
Interference Patterns

ε_0

When EM waves pass through
the slits they are detected via their E-fields
as photons of varying strength energy momenta
producing the impression of a interference pattern

μ_0

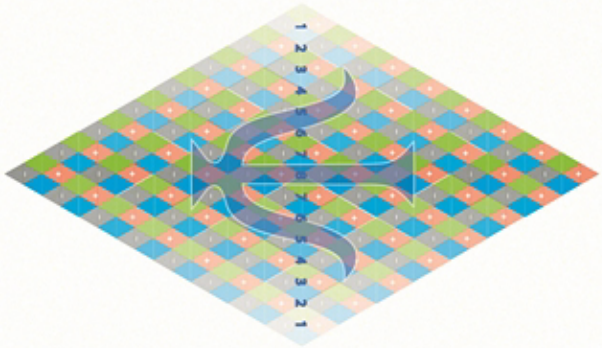
$E = h\nu$



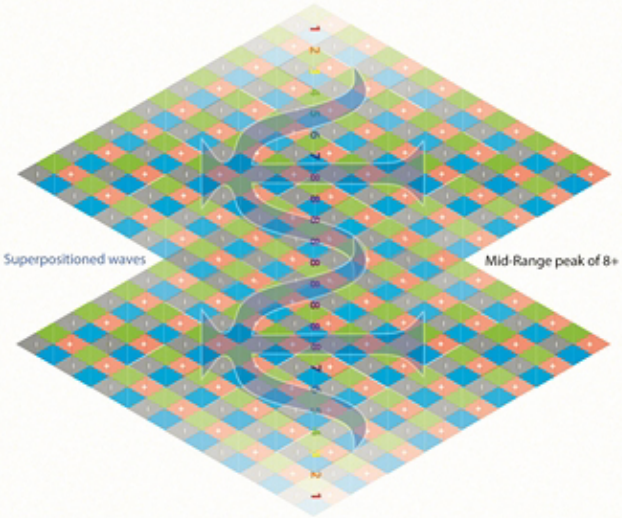
$E = hf$

Every EM wave is comprised of identical, specific wavelength photons which are arranged in a Normal distribution resulting from the electromagnetic Wavefunction with a peak value equal to the wave's amplitude

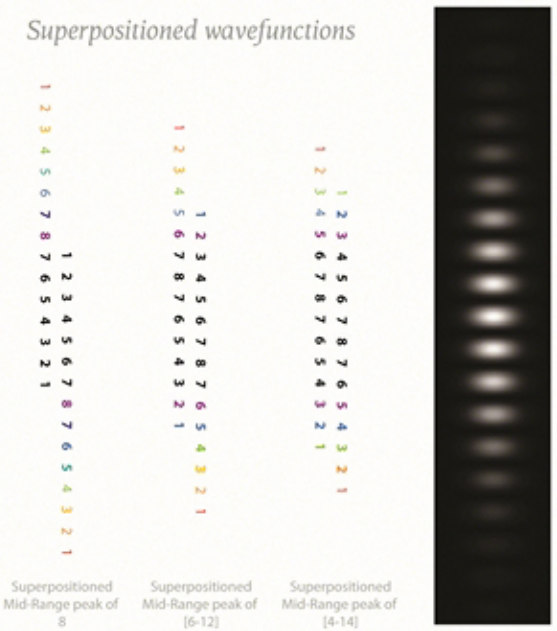
[the square root of the EM wave's Wavefunction/Probability amplitude]



Photons impact screens and
photo-detectors with intensities
that are determined by their
energy momenta distributions



The resultant amplitudes are a direct result of the Phase of the Superpositioned photons within EM waves

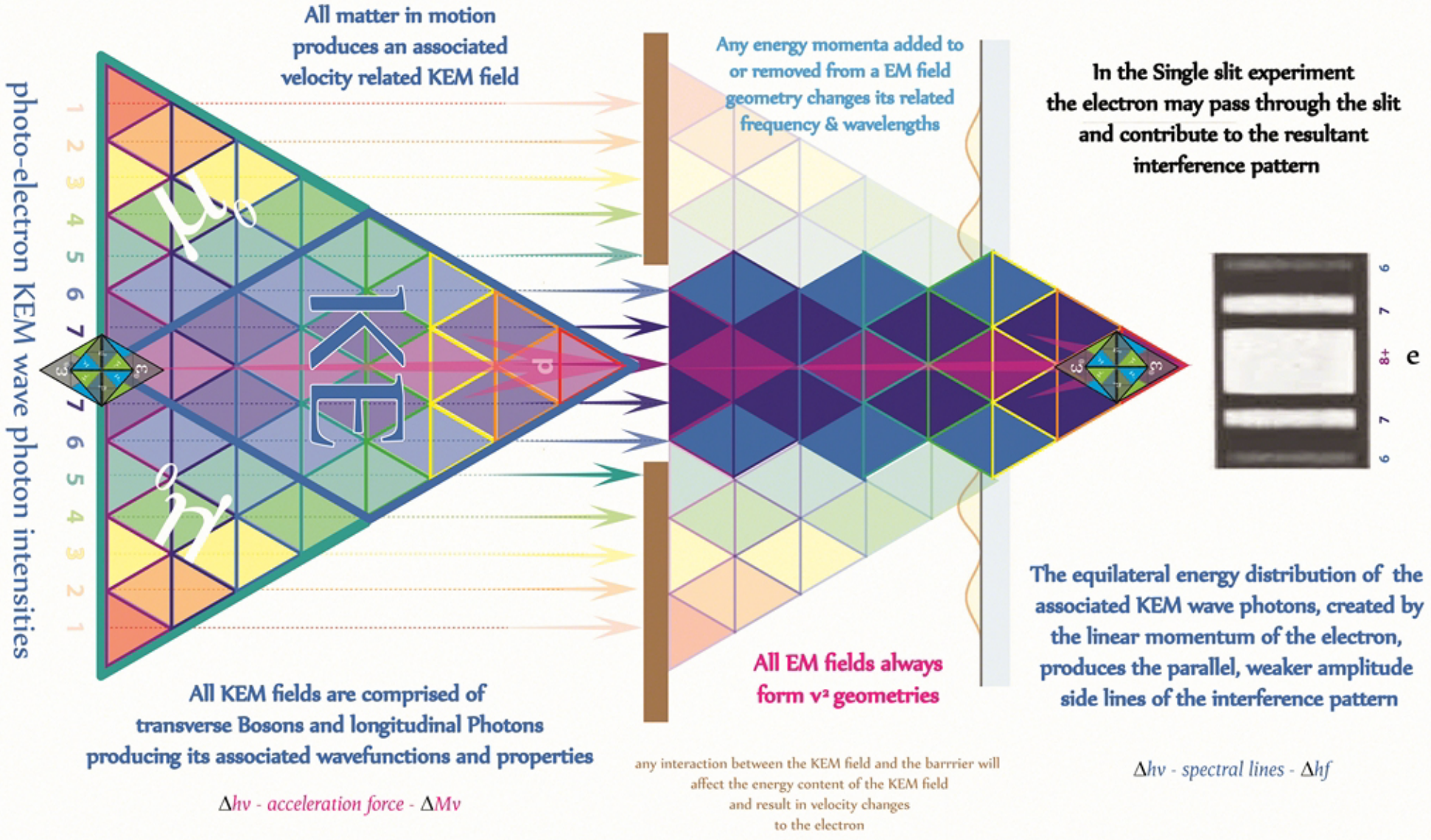


ALL EM mass-ENERGY Matter geometries
being comprised of energy-momenta quanta
are capable of producing interference patterns

The amplitudes of the detected photons in the resultant interference patterns are determined by their constructive/destructive superpositioning in each wave explaining the interference patterns currently accounted for by Young's wave theory

Single slit experiment

If light consisted strictly of ordinary or classical particles, and these particles were fired in a straight line through a slit and allowed to strike a screen on the other side, we would expect to see a pattern corresponding to the size and shape of the slit. However, when this "single-slit experiment" is actually performed, the pattern on the screen is a diffraction pattern with a fairly narrow central band with ever diminishing bands parallel to it on either side



Double slit experiments

The double-slit experiment, sometimes called Young's experiment, is a demonstration that matter and energy can display characteristics of both waves and particles, and demonstrates the fundamentally probabilistic nature of quantum mechanical phenomena and Establishes the quantum interference principle known as wave–particle duality.

Matter particles are stopped by the barrier but the [K]EM wave passes through both slits and is diffracted by them producing weaker EM waves that then superposition with each other to produce interference patterns

It is not the Particle passing through both slits that produces an interference pattern it is the particle's associated K[EM] wave

Equilateral superpositioned KEM waves produce constructive and destructive interference waves that have historically been interpreted as being circular wavefronts

photo-electron KEM wave photon intensities

The Compton frequency of any [K]EM wave is comprised of identical wavelength Photons which can combine to produce interference patterns

electrons will be stopped by the material barrier but their associated KEM field energy momenta will be absorbed by the screen and 'tunnel through' the barrier to contribute to the Interference pattern

final interference pattern produced will depend on phase relationships of the two super-positioned wavefronts

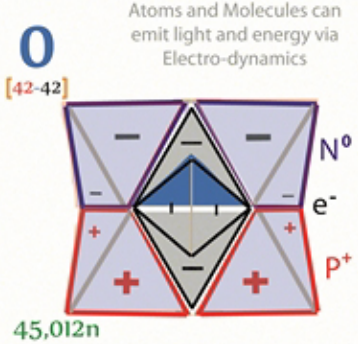
Any detctor placed after the primary screen will remove energy from the secondaryKEM fields and affect the interference patterns produced

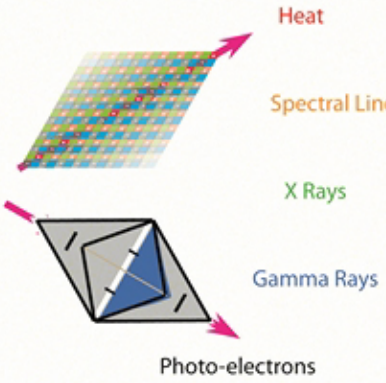
In the basic version of the experiment, a coherent light source such as a laser beam illuminates a thin plate pierced by two parallel slits, and the light passing through the slits is observed on a screen behind the plate. The wave nature of light causes the light waves passing through the two slits to interfere, producing bright and dark bands on the screen — a result that would not be expected if light consisted strictly of particles. However, on the screen, the light is always found to be absorbed as though it were composed of discrete particles or photons.

If one slit is observed for the passage of the electron in order to determine its physical state then the its KEM field wave will be absorbed by the detector resulting in only one wave remaining, enforcing a classical particle outcome

Light wave Reflection

Excited (or higher energy) Atoms and Molecules can emit light and energy via Electro-dynamics





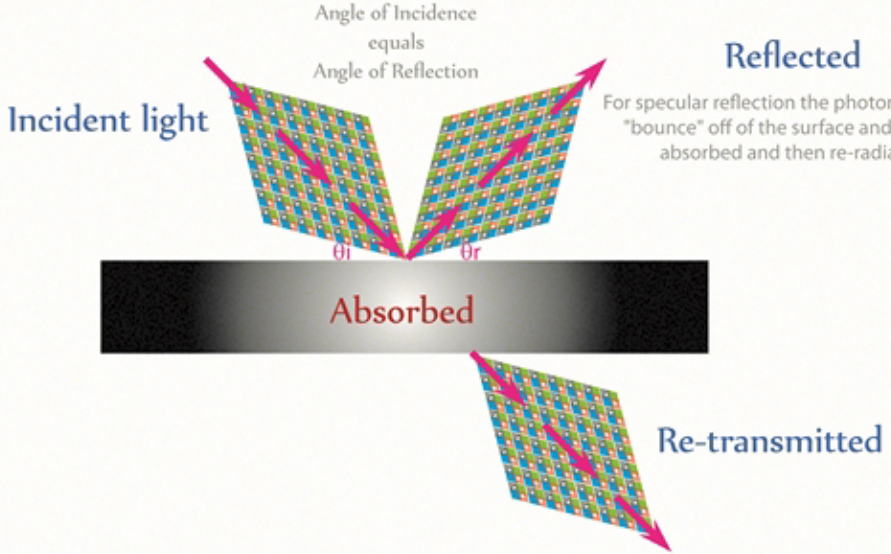
The emitted photon/particle can go in any direction so this is the mechanism for diffuse reflection/radiation.

All Atoms and Molecules have ANGULAR charged fascia in their topologies

Incoming light interacts with a surface and may be absorbed, refelected, and/or transmitted.

Materials have a reflectance spectrum which is a function of the angle of incidence of the incoming light.

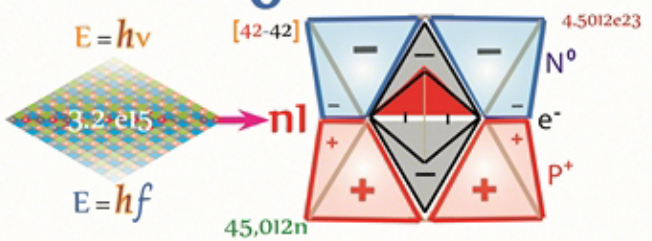
The color of an object is a function of the color spectrum of the incident light and the reflectance spectrum of the object's surface.



Reflected

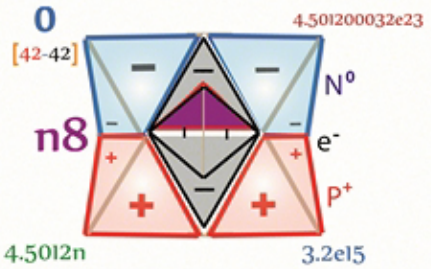
For specular reflection the photons actually "bounce" off of the surface and are not absorbed and then re-radiated

Photon Re-Transmission



When a photon strikes a atom or molecule it generally imparts EM energy as heat and the photon is absorbed

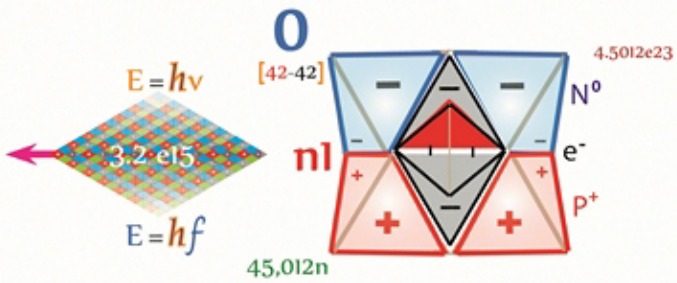
Photon absorption



For some photons their EM energy is equal to the resonance energy of the molecule.

When this happens the photon is absorbed and the molecule is put into an excited state

Photon emission



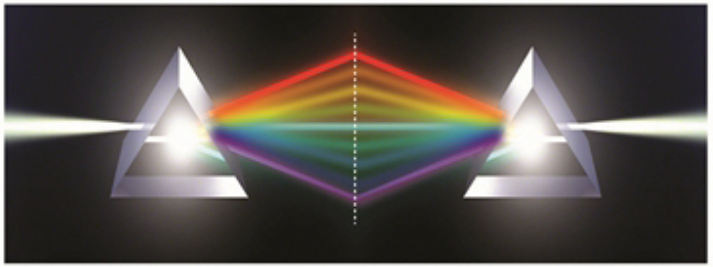
The molecule relaxes from the excited state back to the ground state by emitting a photon with EM energy equal to that of the original photon so the photon appears to have been reflected (but is actually absorbed then emitted)

Lightwave Refraction

The refraction of light when it passes from a fast medium to a slow medium bends the light ray toward the normal at the boundaries between any two media.

The amount of bending depends on the indices of refraction of the two media and is described quantitatively by Snell's Law.

White light can be refracted into its component spectral colours



or be re-combined back into white light through superpositioning

The Fresnel equations, deduced by Augustin-Jean Fresnel describe the behaviour of light when moving between media of differing refractive indices

White Light is comprised of superpositioned waves with differing EM wavelengths

Refraction is the bending of a wave when it enters a medium where it's velocity differs to that in a vacuum

v

n2

E

θi

θr

n1 c

c n1

Varying refractive indices (n) of differing materials produces slower velocities of light in those materials

interference pattern

vphoto-dector

IR heat

n1
n2
n3
n4
n5
n6
n7
n8

Gamma rays

Microwaves

Visible Light

UV rays

visible light spectra comprise only a small percenatage of the EM spectrum

$c = \lambda . f$

Its wavelength increases or decreases but its frequency remains constant

$v = \lambda . f$

Ball Lightning

An alternative radiant geometry for electromagnetic waves exists

γ1

The EM energies in radiant 'ball' lightning are transformer-couplings of energy momenta & self-sustaining until any interaction with Matter topologies occurs

γ3

Descriptions of ball lightning vary wildly. It has been described as moving up and down, sideways or in unpredictable trajectories, hovering and moving with or against the wind; attracted to, unaffected by, or repelled from buildings, people, cars and other objects.

Ball lightning has been described as transparent, translucent, multicolored, evenly lit, radiating flames, filaments or sparks, with shapes that vary between spheres, ovals, tear-drops, rods, or disks

γ5

γ2

γ4

Any interaction with a 'ball' of EM energies will result in an explosive discharge of it's EM energy momenta

γ7

γ6

Nikola Tesla was reportedly able to artificially produce 1.5" (3.8 cm) balls using spark gap technologies

Ball lightning creates a strong Magnetic moment and divergent E fields [similar to a bar magnet without the Matter] creating a "Ball' of light with varying EM energies that is sensitive to external M fields

γ8

Wave~Particle interaction-at-a-distance

All Matter in motion has both:

a standing wave energy topology [Particle] and

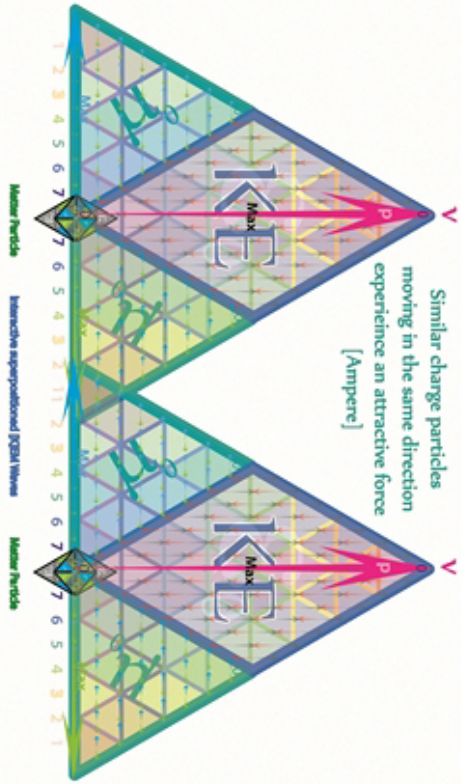
a divergent relativistic, Lorentz velocity corrected geometric field of mass-energy momenta [KEM Wave]

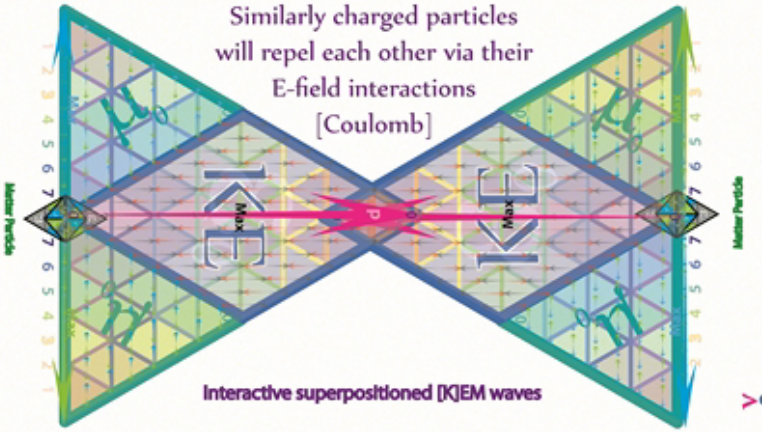
photo-electron KEM wave photon intensities

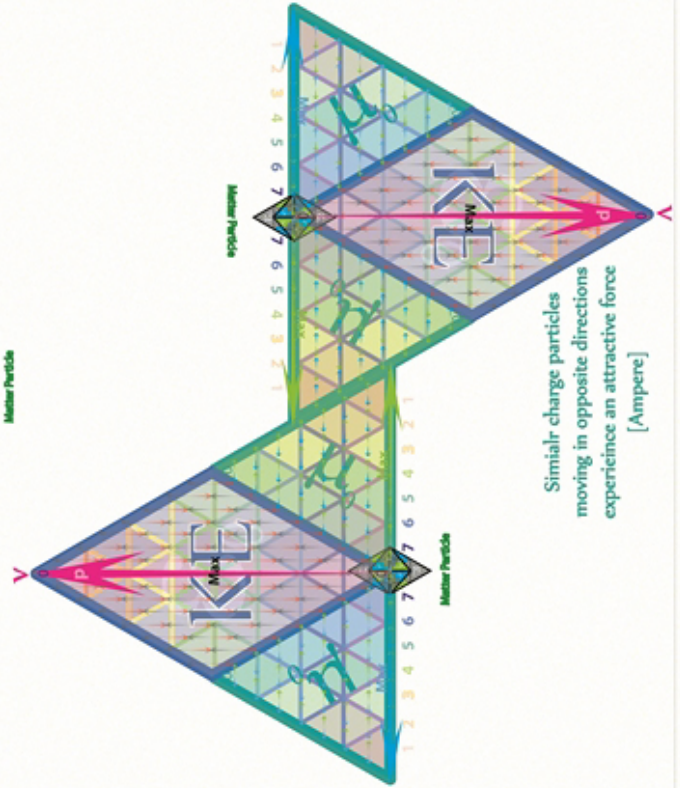
Whether it is Light itself or the KEM field of Matter in motion all EM fields are comprised of transverse bosons and longitudinal photons with probabillistic wave geometries

$$RE = M + KEM$$

relativistic energies *Matter* *kinetic energies*







Force fields and interaction-at-a-distance

All Matter in motion produces an associated Lorentz velocity corrected KEM field of interactive energy momenta photons

Quantum Tunnelling

Particles attempting to travel between potential barriers can be compared to a ball trying to roll over a hill; quantum mechanics and classical mechanics differ in their treatment of this scenario.

Classical mechanics predicts that particles that do not have enough energy to classically surmount a barrier will not be able to reach the other side. Thus, a ball without sufficient energy to surmount the hill would roll back down.

Or, lacking the energy to penetrate a wall, it would bounce back (reflection) or in the extreme case, bury itself inside the wall (absorption).

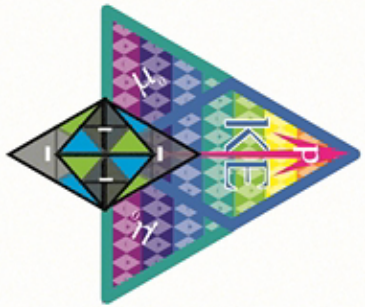
In quantum mechanics, these particles can, with a very small probability, tunnel to the other side, thus crossing the barrier.

The quantum magician's slight of hand trick is where the incident electron is swapped another

All electrons are IDENTICAL

It is practically impossible to identify a particular electron and track it

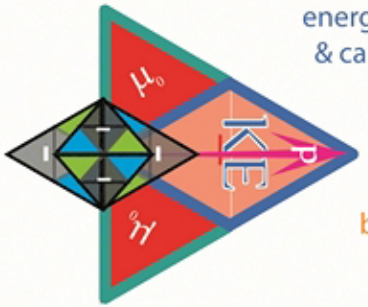
even using spin orientations only eliminates half of the total electrons in the barrier



Reflection of Particle

Absorption of Particle

When the electron is captured by an atom its KEM energies will continue to propagate until it is absorbed or makes its way out through re-emission



KEM field 'tunnels' out

Quantum KEM field tunnelling is an example of conservation of energy momenta on the atomic scale & can be likened to a unidirectional version of Newton's cradle

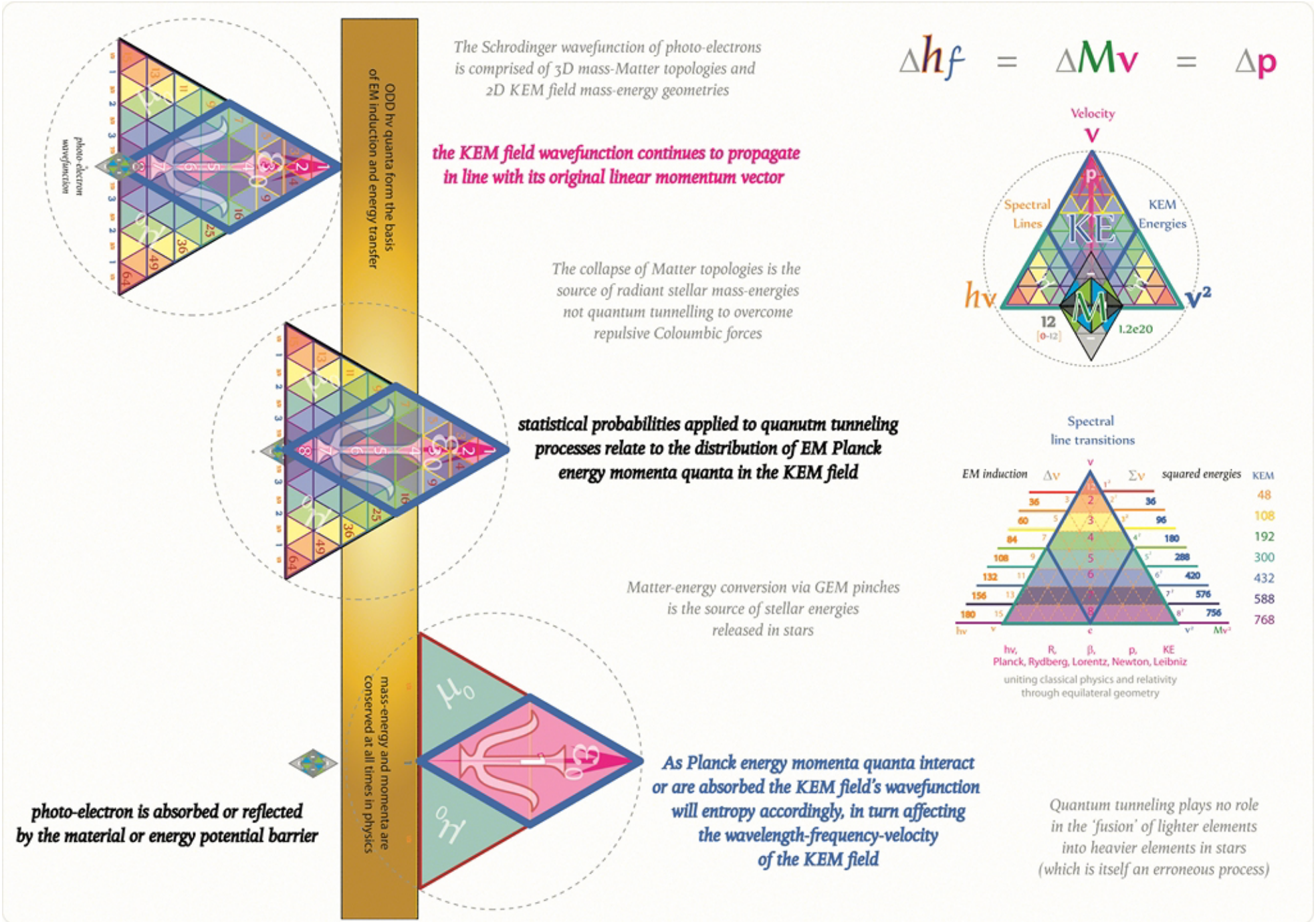
Removal of all electrons but the one under measurement is impractical as it would result in an attractive coloumbic force that would trap the electron in the barrier

If the collision is inelastic the KEM field energy will be reduced along with the particle's velocity

The most probable explanation of quantum tunneling is that the original electron was bound to atoms in the material barrier and its KEM field propagated through the barrier along its original direction of momentum.

Upon reaching the opposite side/edge of the barrier its remaining energies are able to accelerate any weakly bound electron found there

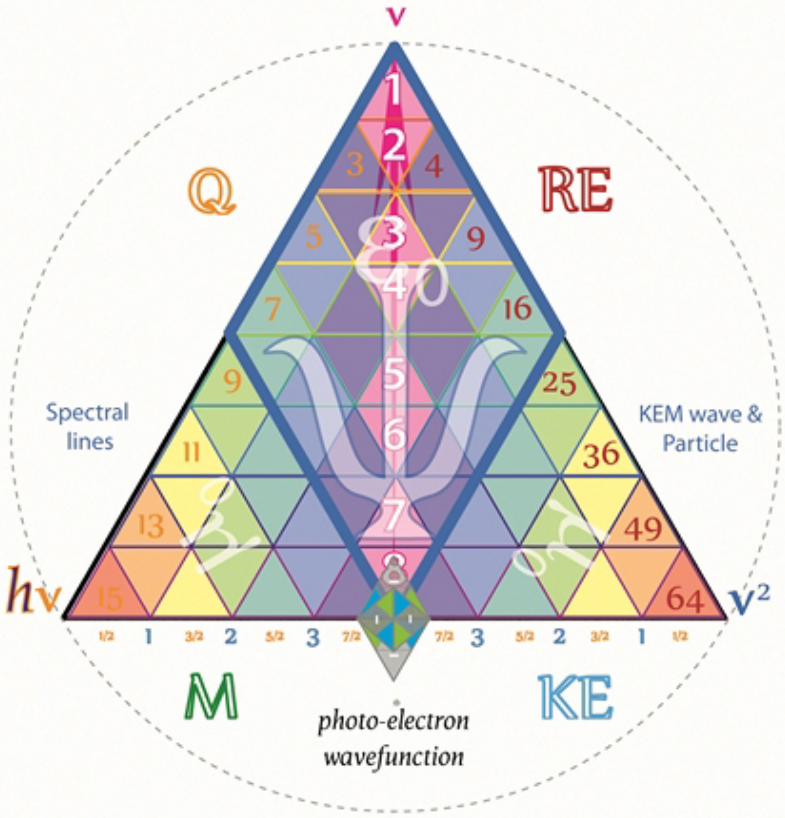
Quantum 'tunnelling' is revealed to be the result of an electron's KEM wave propagation through the barrier not the electron itself



All Matter in motion is comprised of:

a mass-Matter standing-wave topology,
and
a KEM mass-energy field geometry

whose quantised energy momenta is reflective of the particle's vector velocity



The normal distribution of Planck energy momenta in any KEM field is the quantum foundation for the statistical probability mechanics of quanutm mechanics and quantum electrodynamics

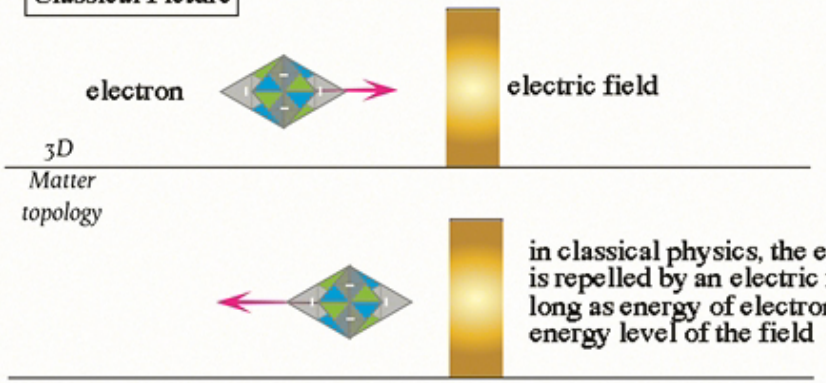
e-

Quantum Tunneling

it makes no difference if the barrier is a EM field or material object

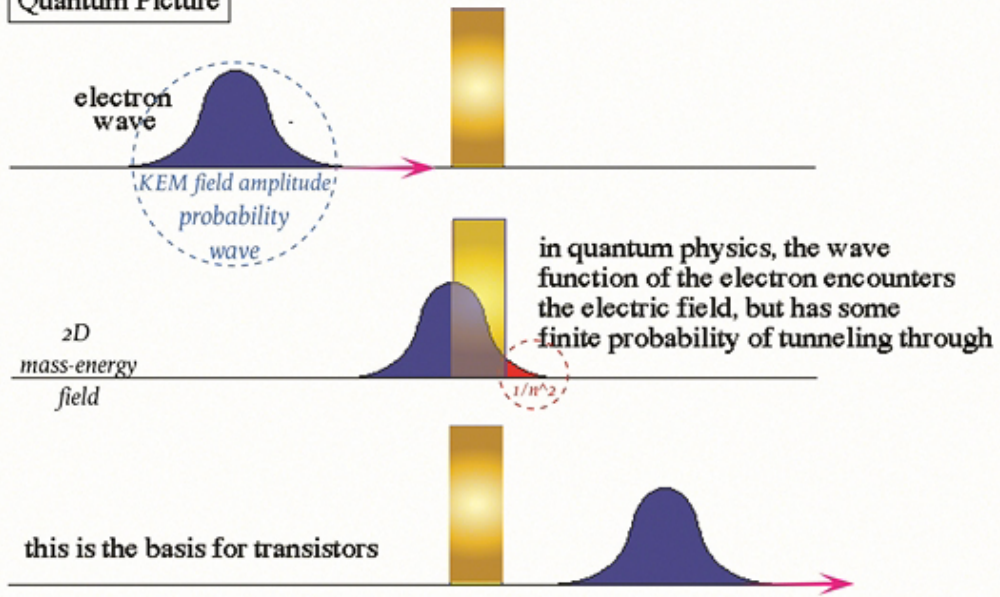
electrons are NOT spherical point particles

Classical Picture



the topological Matter component of a particle's relativisitic quantum wavefunction is distinct from its Lorentz corrected KEM field mass-energy geometry

Quantum Picture



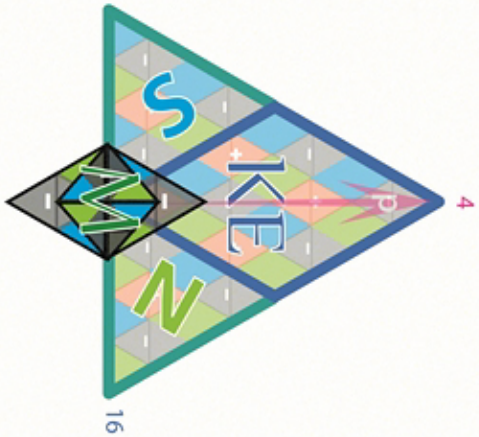
quantum tunnelling is often also utilised in modern physics as a means of overcoming Coulombic charge barriers of Protons in stars in order to explain 'fusion' as the source of stellar energy

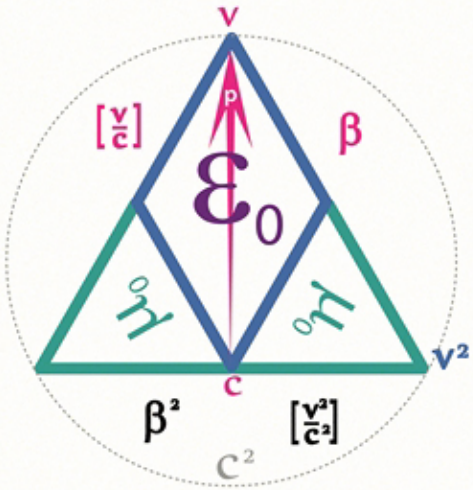
Relativistic Kinetic Energies

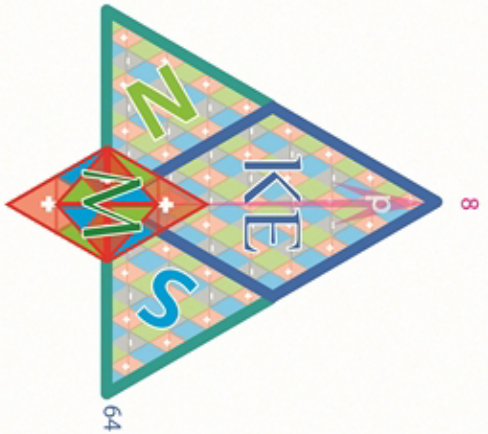
$KE = \frac{1}{2}Mv^2/c^2$

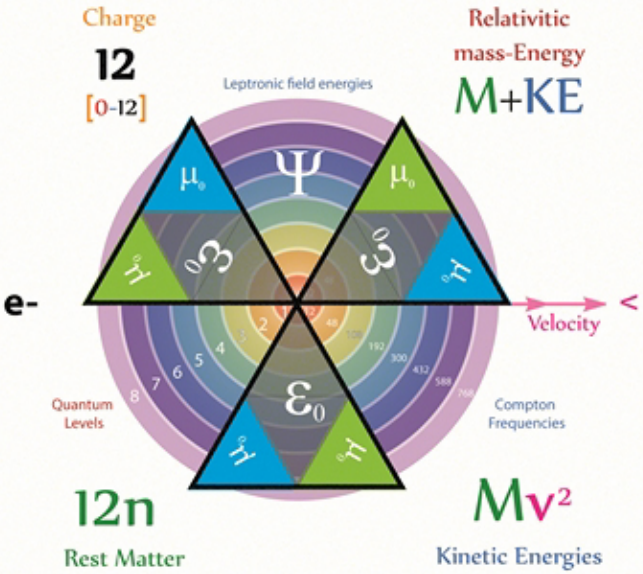
The relativistic Kinetic mass-energies of all Matter topologies in motion are contained in their KEM fields and are subject to Lorentz velocity corrections

$p^2 = E = mv^2/c^2$









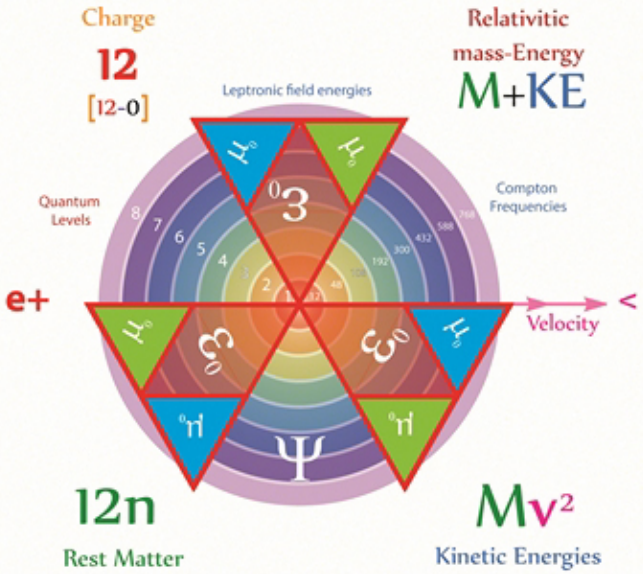
Lorentz contractions only apply to the KEM fields of Matter in motion

The Kinetic Energies of a particle in motion can be expressed in terms of its linear momentum

$\frac{p^2}{2m} = KE = \frac{1}{2}Mv^2$

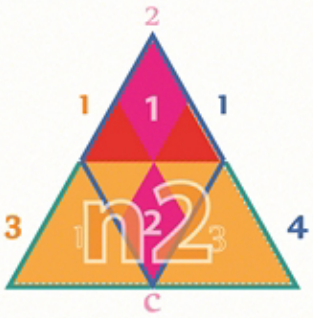
or equally as 1/2 the total relativistic EM mass-energies [exclusive of its invariant rest mass-Matter]

Charge and Matter topologies are Lorentz invariant



Relativistic Lorentz Corrections

ges their name from their earliest appearance, in Lorentzian electrodynamics
as velocity increases the wavelengths and physical scalar geometries of Planck quanta decreases

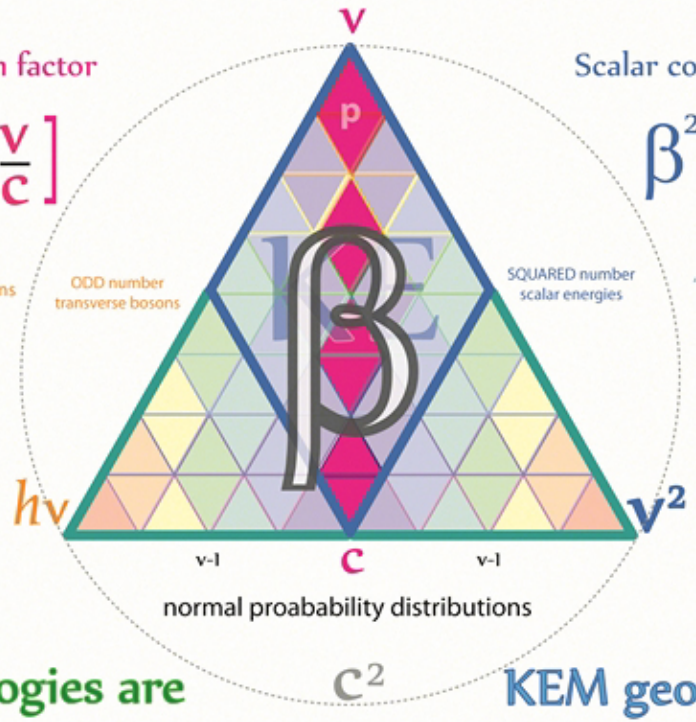


Linear correction factor

$$\beta = \left[\frac{v}{c}\right]$$

Scalar correction factor

$$\beta^2 = \left[\frac{v^2}{c^2}\right]$$



Equilateral QAM contractions

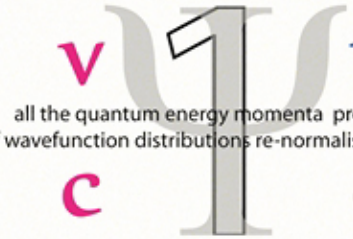
$$t' = \frac{t}{\sqrt{1-\frac{v^2}{c^2}}}$$

'WAVE-length' contractions

$$L = L'\sqrt{1-\frac{v^2}{c^2}}$$

Matter topologies are Lorentz invariant

KEM geometries are relativistic fields



all the quantum energy momenta probabilites of wavefunction distributions re-normalise [or sum] to

The poor definitions of EM mass & Matter has led to the incorrect application of Lorentz corrections to Matter

Lorentz contractions apply to [K]EM waveforms only

c is the limiting velocity for the electrical acceleration of Matter

$$\sqrt{1-\beta^2}$$

Incorrectly applied to Matter topologies in motion, The Lorentz factor or Lorentz term appears in several equations in special relativity.

$$\sqrt{1-\left(\frac{v}{c}\right)^2}$$

The Energy of a Magnet

It is known that Maxwell's electrodynamics--as usually understood at the present time--when applied to moving bodies, leads to asymmetries which do not appear to be inherent in the phenomena. Take, for example, the reciprocal electrodynamic action of a magnet and a conductor. The observable phenomenon here depends only on the relative motion of the conductor and the magnet, whereas the customary view draws a sharp distinction between the two cases in which either the one or the other of these bodies is in motion. For if the magnet is in motion and the conductor at rest, there arises in the neighborhood of the magnet an electric field with a certain definite energy, producing a current at the places where parts of the conductor are situated. But if the magnet is stationary and the conductor in motion, no electric field arises in the neighborhood of the magnet.

In the conductor, however, we find an electromotive force, to which in itself there is no corresponding energy, but which gives rise--assuming equality of relative motion in the two cases discussed--to electric currents of the same path and intensity as those produced by the electric forces in the former case. [On the electrodynamics of moving bodies, A. Einstein, 1905]

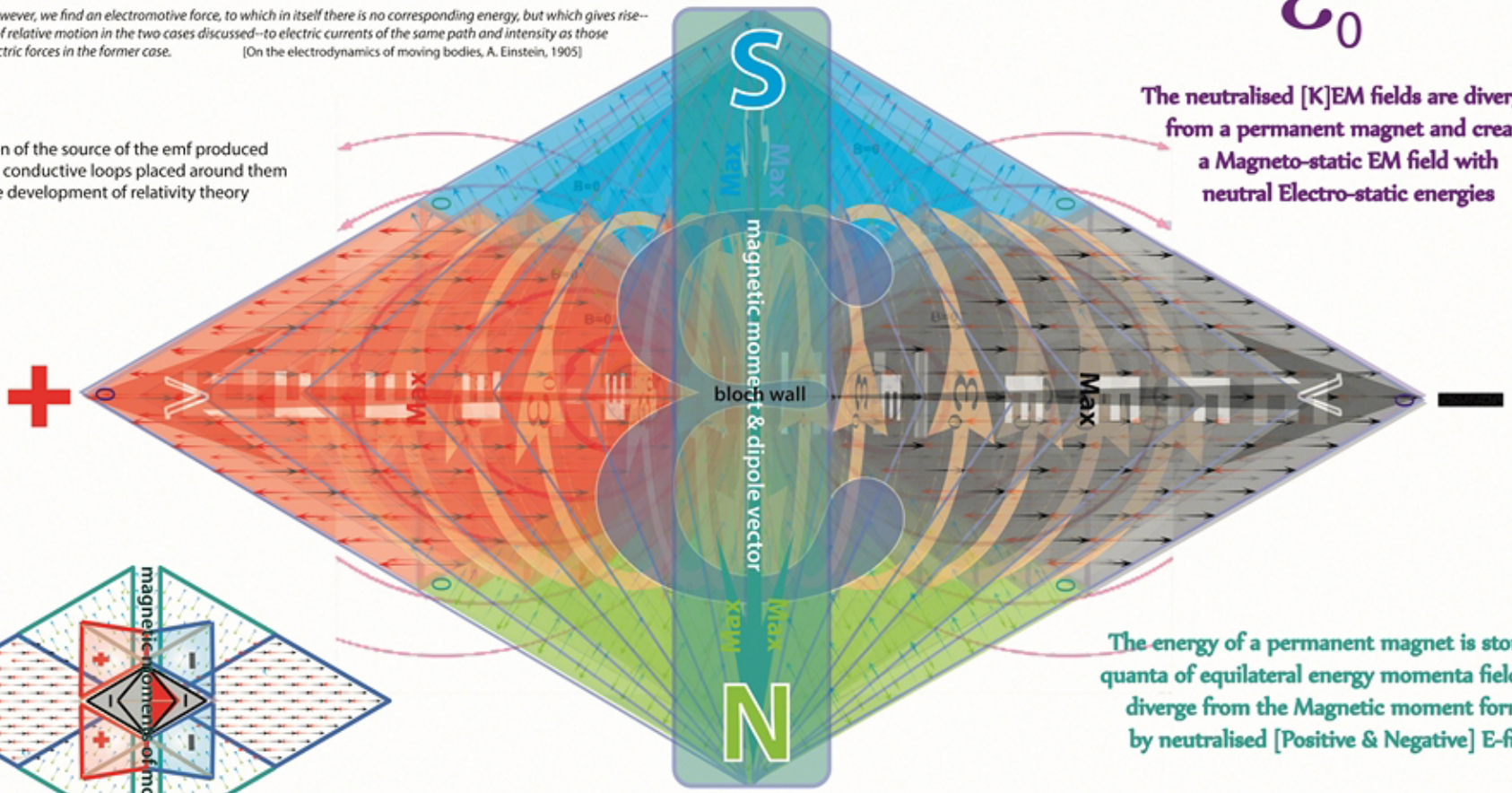
Investigation of the source of the emf produced by magnets in conductive loops placed around them led to the development of relativity theory

V

Energy can be removed by placing a conductive loop between any Positive and Negative quanta the EM field thus creating a potential difference & an electro-motive force

ε_0

The neutralised [K]EM fields are divergent from a permanent magnet and create a Magneto-static EM field with neutral Electro-static energies



The energy of a permanent magnet is stored in quanta of equilateral energy momenta fields that diverge from the Magnetic moment formed by neutralised [Positive & Negative] E-fields

γ^0 η^0

Magnetic fields are produced by moving electric charges and the intrinsic magnetic moments of elementary particles associated with a fundamental quantum property, their spin. In special relativity, electric and magnetic fields are two interrelated aspects of a single object, called the electromagnetic field tensor; the aspect of the electromagnetic field that is seen as a magnetic field is dependent on the reference frame of the observer. In QED, the electro-magnetic field is quantized and electromagnetic interactions result from the exchange of photons.

Ω

Classically, the energy of a permanent magnet 'circulates in endless loops' from North to South in 3 dimensions around the magnetic moment

$E = h\nu$

BOSONS are transverse EM waves [charge carriers]

PHOTONS are longitudinal EM waves [neutral charge carriers]

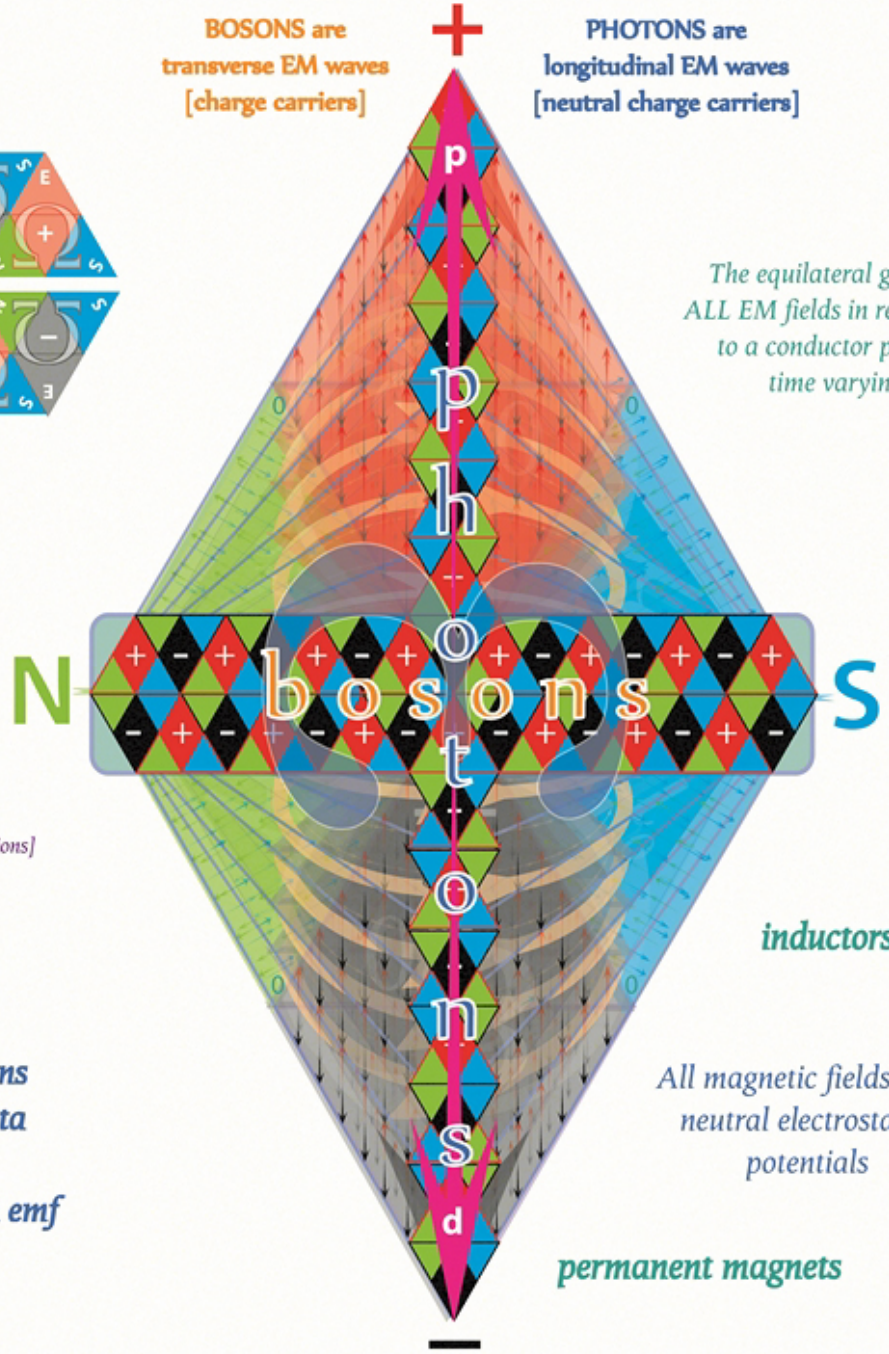
$E = hf$

The equilateral geometry of ALL EM fields in relative motion to a conductor produces a time varying emf

$$B = -\frac{d\phi_\varepsilon}{dt}$$

A changing Electric field produces a changing Magnetic field

The is no such entity as a purely Electric field [all fields are Electro-Magnetic in their geometric foundations]



$$\mathcal{E} = -\frac{d\phi_B}{dt}$$

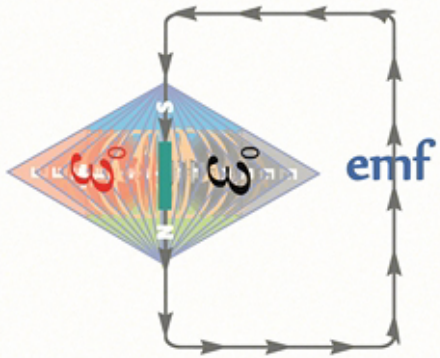
A changing Magnetic field produces a changing Electric field

The is no such entity as a purely Magnetic field [all fields are Electro-Magnetic in their geometric foundations]

Any two separated charge bosons contain charged energy momenta that once connected via a conductive circuit will produce an emf

inductors

All magnetic fields store neutral electrostatic potentials



permanent magnets

The moving magnet - conductor problem

$B = -\frac{d\phi_\varepsilon}{dt}$

$\varepsilon = -\frac{d\phi_B}{dt}$

All permanent magnets are electromagnetic fields comprised of
transverse bosons and longitudinal photons

We see two observers both moving, approaching each other.

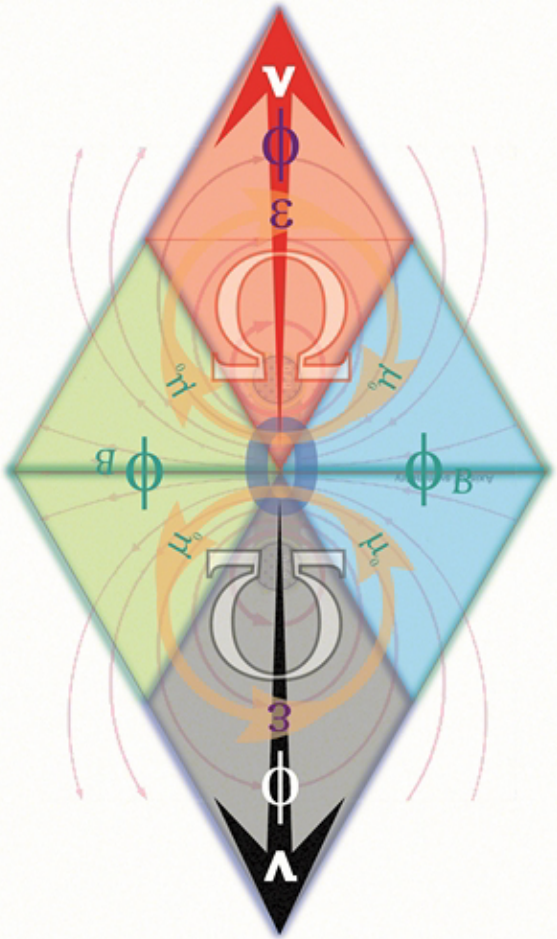
Observer 1 says:

The conductive loop is stationary and the magnet is moving toward it.
The electrons in the loop are stationary and have no magnetic moments
There is a magnetic field, but it can't produce any force on
the electrons since they are stationary within the loop.

Instead, the magnetic field is changing, growing stronger as
the magnet gets closer, and this changing magnetic field
produces an electric field which causes forces on the electrons, and
drives them around the loop producing the current in the galvanometer.

Conductor Frame of Reference
(Moving Magnet)

Charged boson field geometries
contain equilateral energy momenta
with transverse magnetic dipoles



Neutral photon field geometries
produce electromotive forces as a result
of the charged bosons that make them

Magnet Frame of Reference
(Moving Conductor)

Observer 2 says:

The magnet is stationary and the loop is moving toward it.
The electrons in the loop, since they are moving with the loop,
generate their own magnetic moments and experience Lorentz forces
as a result of the external magnetic field [F = q v X B],
which drives them around the loop and produces the current in the galvanometer.

There is no electric field.

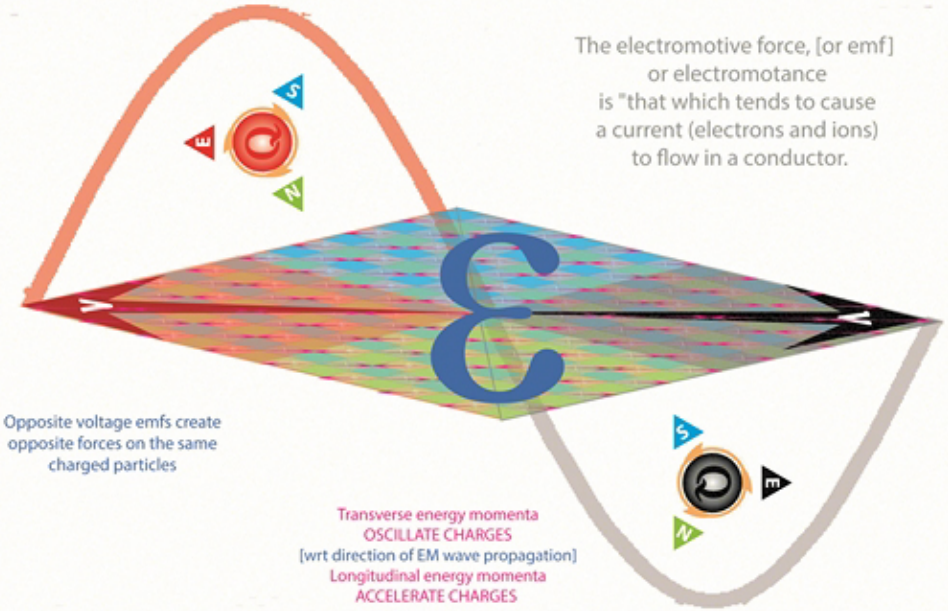
Special relativity postulates that electric fields in one reference frame become magnetic fields in another frame

Tetryonic theory shows geometrically that the Electric and Magnetic fields are discrete, invariant geometries
resulting from the equilateral 'inductive' mass-energy [Planck quanta] geometries that comprise all EM fields.
It is the relative motion of these geometries wrt a conductor that creates changing E&M field flux strengths in turn producing an emf.
When there is no relative motion in either the EM field or the conductor, no emf is produced

The Electromotive Force

"A source of emf can be thought of as a kind of charge pump that acts to move a charge from a point of low potential through its interior to a point of high potential. …
The emf of the source is defined as the work done per charge dq: = dW/dq."

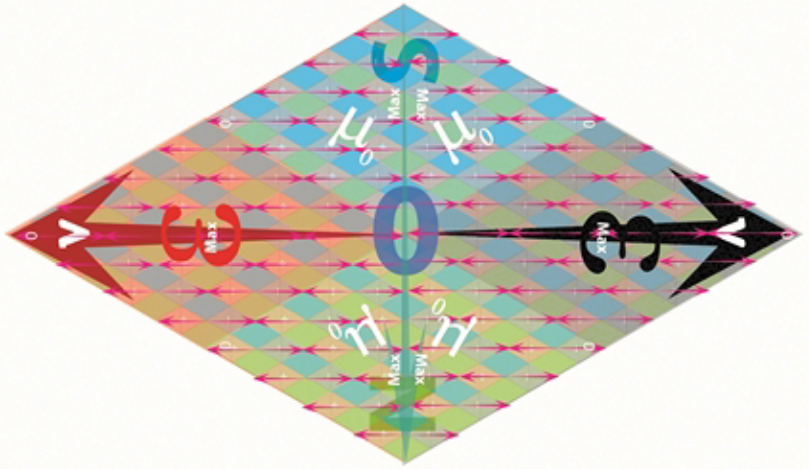
The electromotive force, [or emf] or electromotance is "that which tends to cause a current (electrons and ions) to flow in a conductor.



Opposite voltage emfs create opposite forces on the same charged particles

Transverse energy momenta
OSCILLATE CHARGES
[wrt direction of EM wave propagation]
Longitudinal energy momenta
ACCELERATE CHARGES

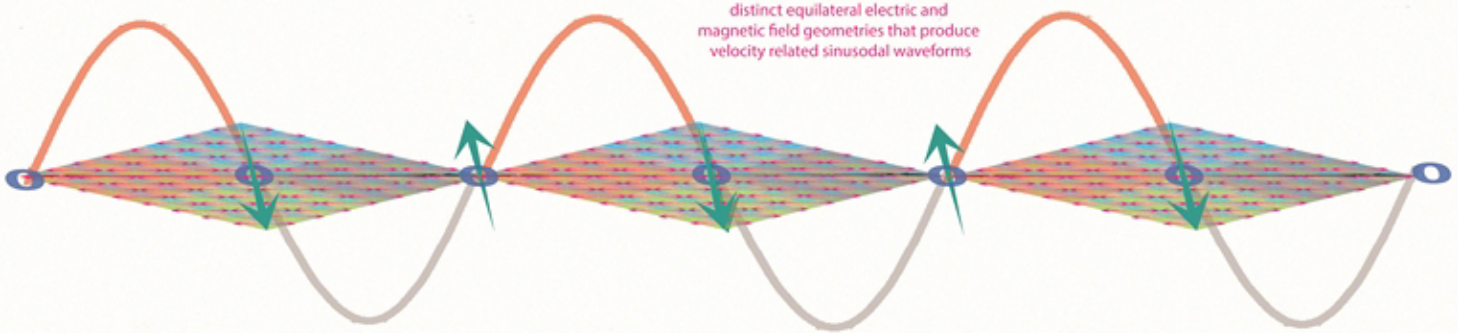
Opposite charged particles experience opposing forces due to the emf



THe magneto-static fields of all Magnets are comprised of electromagnetic fields of discrete Planck energy momenta quanta, which in turn are capable of accelerating charged particles

All ElectroMagnetic fields have distinct equilateral electric and magnetic field geometries that produce velocity related sinusodal waveforms

$$B = -\frac{d\phi_\varepsilon}{dt}$$



$$\varepsilon = -\frac{d\phi_B}{dt}$$

Charged boson field geometries can be viewed as transverse quantum capacitors

Lenz's law:
"The emf induced in an electric circuit always acts in such a direction that the current it drives around the circuit opposes the change in magnetic flux which produces the emf."

Neutral photon field geometries can be viewed as longitudinal quantum batteries

The Moving Magnet problem

An electromotive Force results from the motion of a conductor relative to a magnetic field

A Magnet is really an electrostatic store of neutralised emf potential differences [creating an orthagonal Magnetic moment]

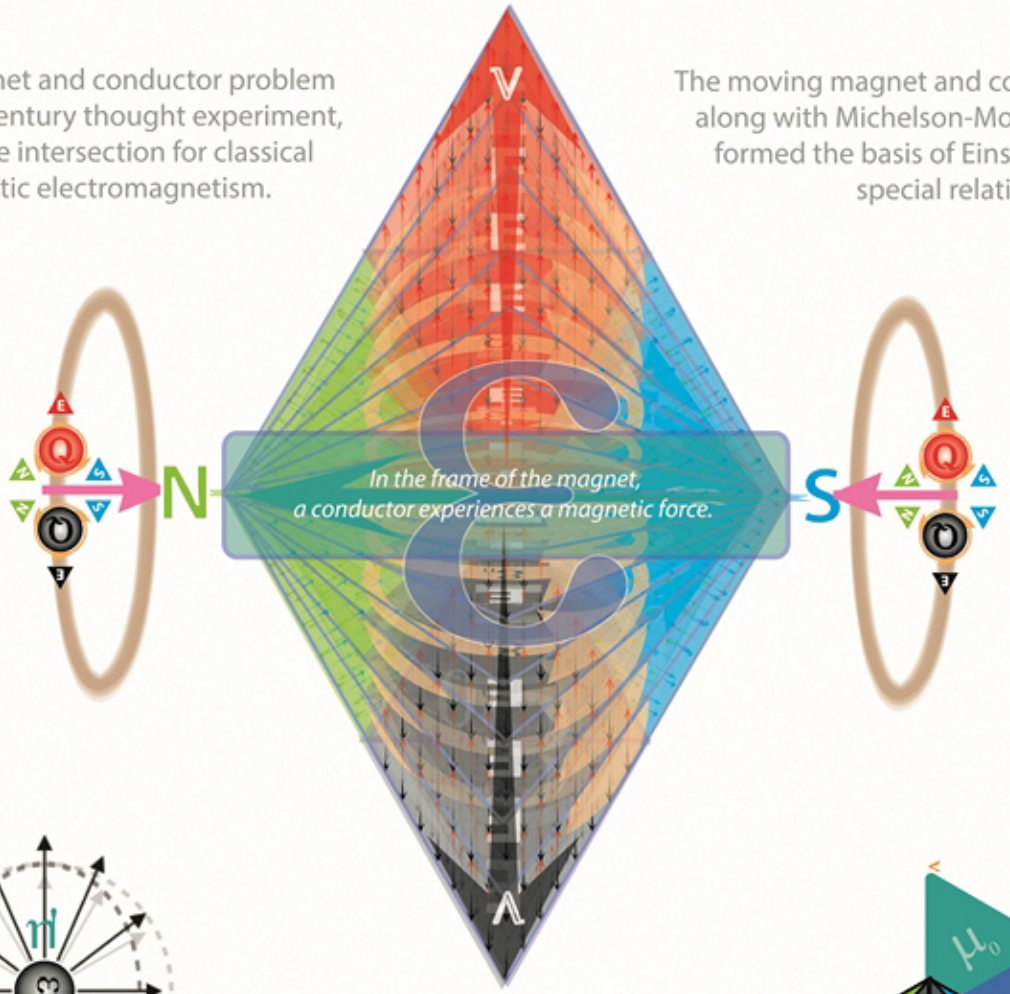
The moving magnet and conductor problem is a famous 19th century thought experiment, and provides the intersection for classical and relativistic electromagnetism.

The moving magnet and conductor problem, along with Michelson-Morley experiment, formed the basis of Einstein's theory of special relativity.

Relativistic theory explanation

In the frame of a conductor moving relative to the magnet, the conductor experiences a force due to an electric field.

A Magnetic field is an Electric field viewed in a differing inertial frame



Tetryonic theory explanation

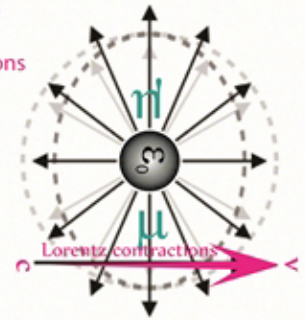
The conductor moves through continuously changing electric and magnetic field geometries experiencing sinuodal E/M forces that are directly related to each other at all times

Electric and Magnetic fields are discrete geometrically related energies

SR requires that all observers in inertial frames arrive at the same form for Maxwell's equations

SR seeks to modify space and time in a manner such that the forces and fields transform consistently.

producing expressions that differ from Newton's law of motion by a factor of γ



the relativistic distortion of accelerating spherical point charges creates magnetic moments

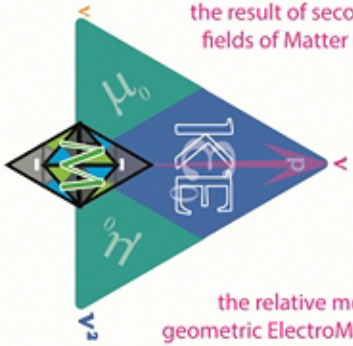
Electrostatic particles have no magnetic moment

$$\vec{F} = q\vec{E} + q\vec{v} \times \vec{B}$$

Electric force *Magnetic force*

Once in motion it posseses a magnetic moment and kinetic energies and is subject to Lorentz forces when it moves throuhg an external EM field

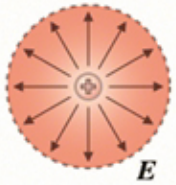
magnetic moments are the result of secondary KEM fields of Matter in motion



Lorentz corrections only all to KEM field mass-energies

the relative motion of geometric ElectroMagnetic fields creates changing EM forces

rest mass-Matter



v=0

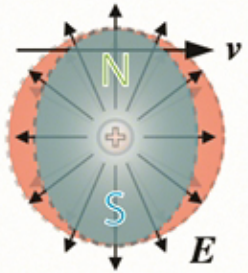
Einstein's Error of perception

In its rest frame the electric field of a point charge has the same strength in all directions and diverges away from the charge.

Electric fields are distorted due to relativistic speed effects to create Magnetic fields
The faster the velocity the greater the Magnetic field
At rest the Magnetic field becomes an Electric field

What led me more or less directly to the special theory of relativity was the conviction that the electromotive force acting on a body in motion in a magnetic field was nothing else but an electric field

Albert Einstein 1953



v=.6c

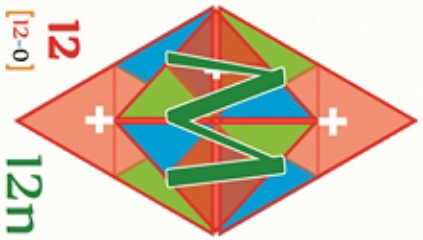
The SR theoretical model of a spherical charged body being relativisitically distorted as the the source of the Magnetic moments for charges in motion is incorrect

Lorentz velocity dependent factors relate only to Kinetic EM mass-energies of motion

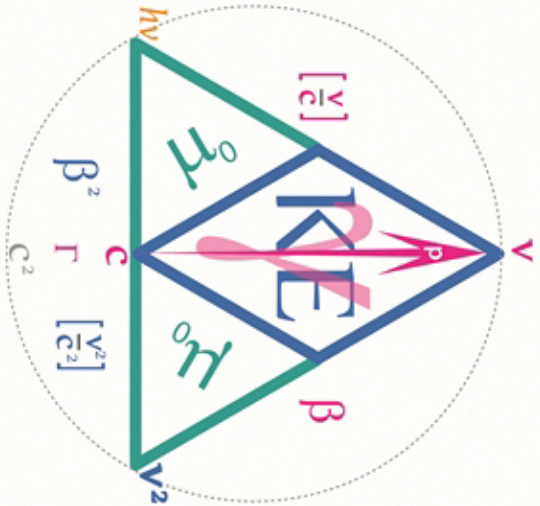
M + *It is the KEM field mass-energies that produce Magnetic moments in relativistic particles due to the motion of ElectroStatic Matter (12 + loop inductive geometries)* = RE

Stationary Leptons are 12pi charged standing waves [Matter] topologies with NO secondary Kinetic EM mass-energies geometries

Matter is Lorentz invariant

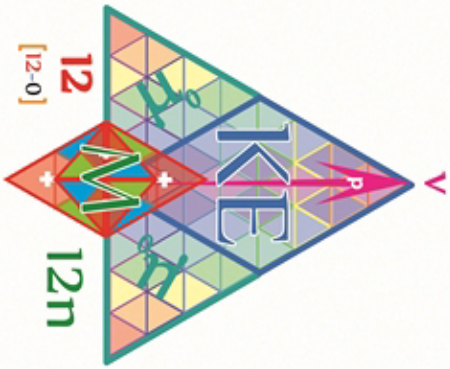


Stationary charges have Electric Fields and neutralised Magnetic fields



The speed of light in a vacuum [c] is the limit for electrically accelerated particles
Tetryonic geometry reveals it is NOT the limit of acheivable velocities

Moving Leptons are 12pi charged standing waves [Matter] topologies with Kinetic EM mass-energies geometries



Moving charges have Electric fields and Magnetic moments

Tetryonic relativistic motion

ε_0

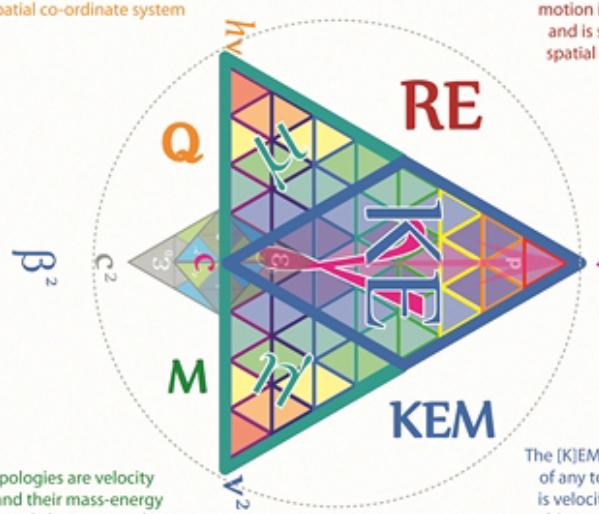
The [K]EM mass-energy content of a particle in motion is velocity dependent
its rest Matter toplogy & charge geometries are velocity invariant

μ_0 η_0

In a frame in which the particle is at rest, we can detect only electric field

Charge is a velocity invariant measure of the quantised angular momenta iof any spatial co-ordinate system

The total EM mass-energy momenta of any particle in motion is velocity dependent and is specific to particular spatial co-ordinate systems

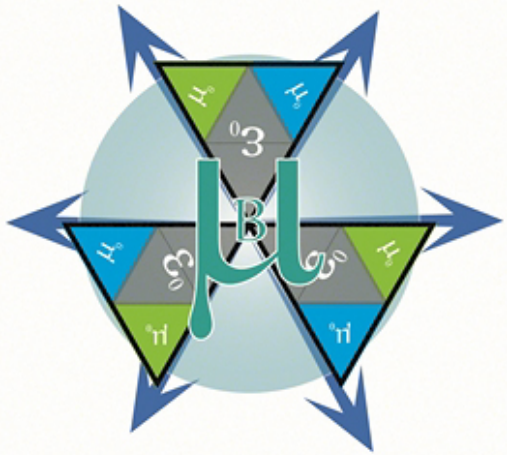


Matter topologies are velocity invariant and their mass-energy content can only be measured in c^4 spatial co-ordinates

The [K]EM field mass-energies of any topology in motion is velocity dependent and subject to Lorentz correction within in its c^2 spatial co-ordinates

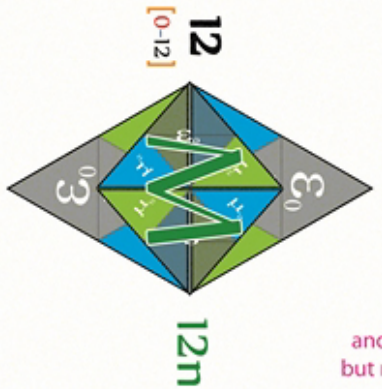
It is well demonstrated that the fields of charged particles appear different in different inertial frames

In a frame in which the particle is moving, we also see a magnetic field.



rest Matter

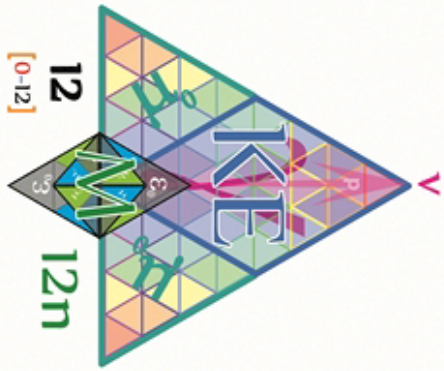
all Magnetic dipoles are neutral dipole pairs



$$Mv^2 = KEM = hv^2$$

rest Matter+KEM

relativistic KEM fields produce a secondary magnetic moment



Tetryonics has revealed that the Kinetic Electro-Magnetic [KEM] field of a particle in motion has a distinct geometric identity of its own rather than being the relativistic distortion of a charged EM particle

Virtual particles and action-at-a-distance are negatived by Tetryonic KEM field mass-energy momenta and the problem of simultanity is avoided because a second particle responds not directly to the first particle, but rather to the first particle's extended, velocity related [K]EM field generated by its motion at its own position.

Quantum level

KEM field

James Clerk Maxwell

(13 June 1831 – 5 November 1879)

KEM field

Quantum level

n1

n2

n3

n4

n5

n6

n7

n8

ε_0 μ_0

All quantum charge arrangements of EM mass-energy and force fields can be viewed as an arrangement of 'quantum idler wheels

"As early as 1857 Maxwell began to develop the idea of orienting molecular vortices along magnetic field lines, culminating in the publication of his paper 'On physical lines of force'…

He posited a honeycomb of vortices in which each vortex cell was separated from its neighbour by a layer of spherical particles, revolving in the opposite direction to the vortices.

These 'idler wheel' particles communicated the rotatory velocity of the vortices from one part of the field to another. In this ether model, the most famous image in nineteenth-century physics, the analogy provides mechanical correlates for electromagnetic quantities. The angular velocity of the vortices corresponds to the magnetic field intensity, and the translational flow of the idle wheel particles to the flow of an electric current; the field equations are based on the rotation of molecular vortices in the ether.

He emphasized that while the theory was mechanically conceivable, the model itself was provisional and temporary, even awkward, hardly 'a model of connexion existing in nature'

Equating Equilateral geometries to Quantised Angular Momentum reveals a classical mechanical model closely resembling Maxwell's hypothesised idler wheels that be be applied to any EM field of force

Virtual Particles

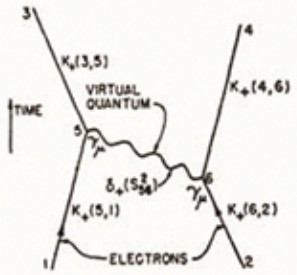
In physics, a virtual particle is a particle that exists for a limited time and space, it has become a commonplace mechanism in current Physical theories to provide a basis for the Force interactions between particles

The energy and momentum of a virtual particle are uncertain according to the uncertainty principle.

$$m^2v^4 = E^2 = p^4$$

The degree of uncertainty of each is inversely proportional to time duration (for energy) or to position span (for momentum).

Original Feyman diagram illustrating the exchange of a quantum between 2 electrons



$$mv^2 = E = pv$$

Bohr understood that if you are going to try to be mechanical, you have to show some convincing mechanics.

If you can't show some convincing mechanics, you might as well dodge all mechanics from the beginning, staying with the math.

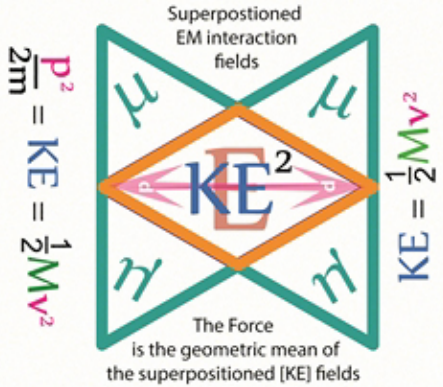
He had learned this from Maxwell, who had done the same thing 60 years earlier.

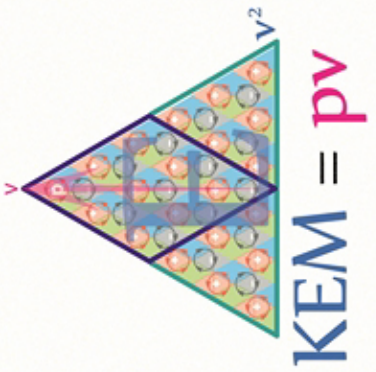
In the 1860's, Maxwell had tried to create vortices to explain the field mechanics, but, finding himself under heavy fire from Lord Kelvin and others, he decided to give it up and go to other mathematical alternatives like quaternions instead.

$m^2c^4 = E^2 - p^2c^2$

is in-correct for superpositioned 2D KEM fields the real interaction geometry is illustrated below:

$$\frac{m\Omega^2v^4}{2} = KE^2 = \frac{p^2v^2}{2}$$





The equilateral energy geometry of Tetryonics clears up this issue once and for all, virutal particles do NOT exist. The Force interactions between all Matter in relative motion is mediated by the equilateral geometries of [K]EM mass-ENERGY momenta that spread out from their source Matter through Space-time

Equilateral geometry - the Hidden Constant

$$kg\ m\Omega_{\frac{m^2}{s}} = h\ kg\frac{m^2}{s}$$

Quantised Angular Momenta has an equilateral geometry

$$1\pi\ [[\varepsilon_0\mu_0].[m\omega v^2]]$$

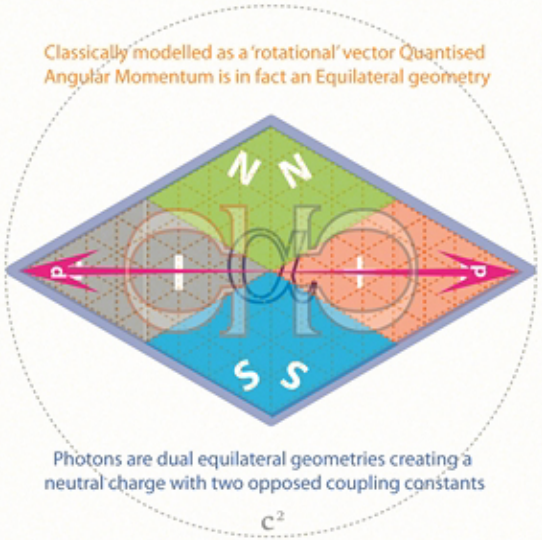
Charge — EM Field — Planck quanta

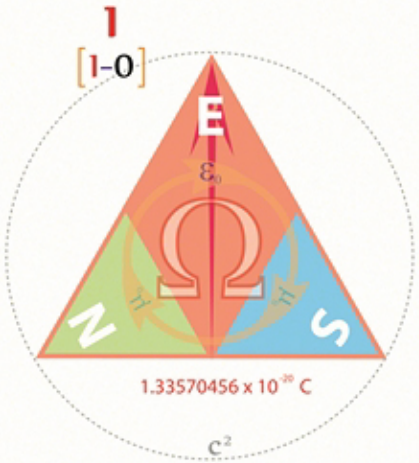
ElectroMagnetic — mass — velocity

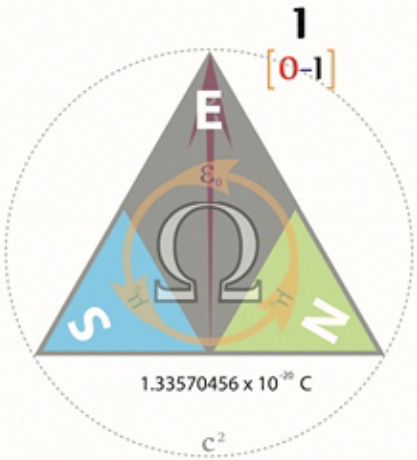
Tetryonics has revealed the equilateral relationships between Charge, Planck energies and the Constants showing quantised angular momentum to be the 'hidden' geometric constant driving the physics of our Universe on all scales

Alpha is the geometric coupling constant between Magnetic and Electrical energies that acts as a scaling constant between Kinetic and Potential quantum energies

It is the source of the quantum charges of all EM mass-energy momentum & inertia





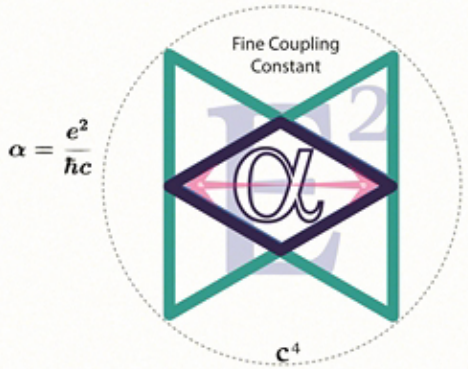


Quantised Angular Momenta creates charged EM mass-energies

.0012

2π

.007539822



$$\alpha = \frac{e^2}{\hbar c} \qquad \alpha = \frac{e^2}{\hbar c\, 4\pi\varepsilon_0}$$

$7.297\,352\,5376(50) \times 10^{-3}$

$$= \frac{1}{137.035\,999\,679}$$

132.6291192^{-1}

The ALPHA Constant is the scalar coupling field of quantised energy momenta in superpositioned EM fields that facilitates Force (linear energy momenta) exchanges, resulting in the familiar Laws of Attraction/Interaction

In physics, the fine-structure constant is a fundamental physical constant, namely the coupling constant characterizing the strength of the electromagnetic interaction.

The numerical value of α is the same in all systems of units, because α is a dimensionless quantity.

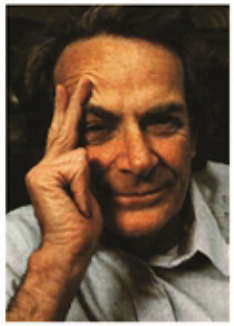
There is a most profound and beautiful question associated with the observed coupling constant, e the amplitude for a real electron to emit or absorb a real photon. It is a simple number that has been experimentally determined to be close to 0.08542455.

It has been a mystery ever since it was discovered more than fifty years ago, and all good theoretical physicists put this number up on their wall and worry about it.

Immediately you would like to know where this number for a coupling comes from: is it related to pi or perhaps to the base of natural logarithms? Nobody knows. It's one of the greatest damn mysteries of physics: a magic number that comes to us with no understanding by man.

We know what kind of a dance to do experimentally to measure this number very accurately, but we don't know what kind of dance to do on the computer to make this number come out, without putting it in secretly

Richard Feynman



(May 11, 1918 – February 15, 1988)

equilateral energies

.0012 m²/s

Superpositioned Fields

0.007539822

132.6291192^{-1}

Alpha coupling Constant

You might say the "Hand of GOD" wrote that number, but "we don't know how HE pushed his pencil."

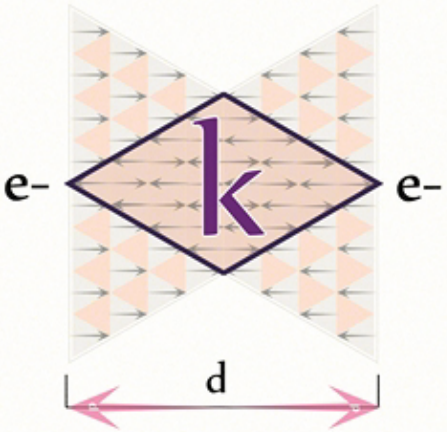
The Fine Structure Constant

$2\pi[QAM]_{.0012} = 0.007539822$

Arnold Sommerfeld introduced the fine-structure constant in 1916 as a fundamental physical constant, namely the coupling constant characterizing the strength of the electromagnetic interaction.

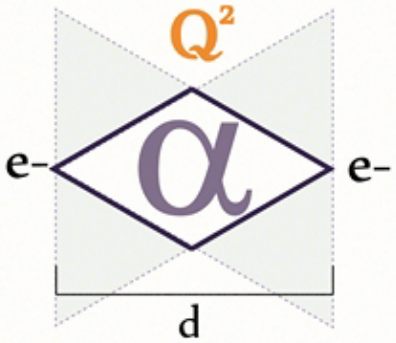
$2\pi[QAM]^{-1}_{.00119997} = 132.6291192$

In quantum electrodynamics, α is the coupling constant determining the strength of the interaction between electrons and their exchange photons



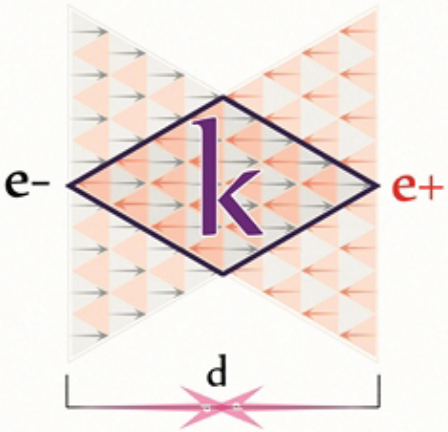
Similar Charges REPEL

10^{-6}
weak force



It is a dimensionless quantity that has a constant numerical value in all systems of units that is the direct result of its equilateral geometry.

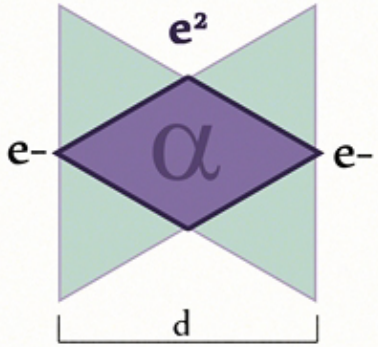
1
strong force



Opposite Charges ATTRACT

$\alpha = .007539822$

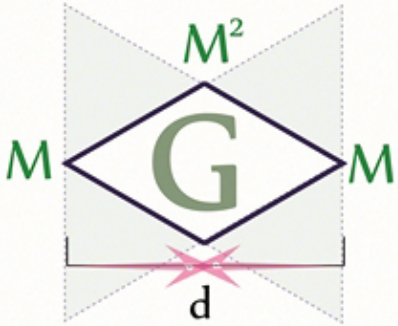
It can now be revealed to be a measure of the forces produced by, or contained in, the geometry of two superpositioned KEM [E^2] field energies



the energy needed to overcome the electrostatic repulsion between two electrons separated by a distance of d

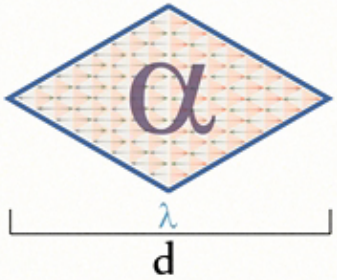
The alpha constant applies equally to the coupling of Electric and Gravitational superpositioned fields

10^{-39}
gravity



Gravitational Matter is always ATTRACTIVE

$7.5e^{-3}$
EM forces



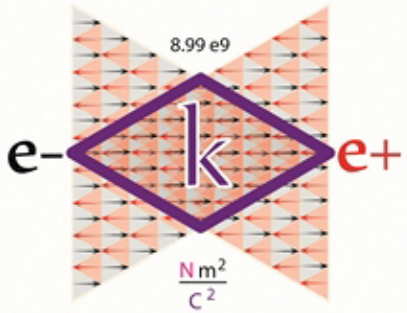
the energy of a single photon of wavelength λ that provides the energy momenta required to create a force between particles

Coupling Constants

$$k\frac{Q_1 Q_2}{r^2} = F$$

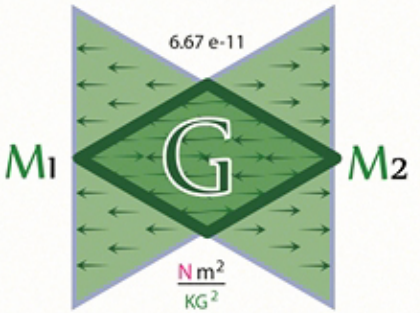
Coulomb's [k], the Fine structure constant [α] and Newton's [G] are all reflections of the same coupling constant geometries differing only by the strength of their respective superpositioned energy field densities

$$F = -G\frac{M_1 M_2}{r^2}$$



Coulomb's constant

Newton's constant



$$\beta = \left[\frac{v}{c}\right]$$

Linear force coupling constant

$$\beta^2 = \left[\frac{v^2}{c^2}\right]$$

Scalar energy coupling constant

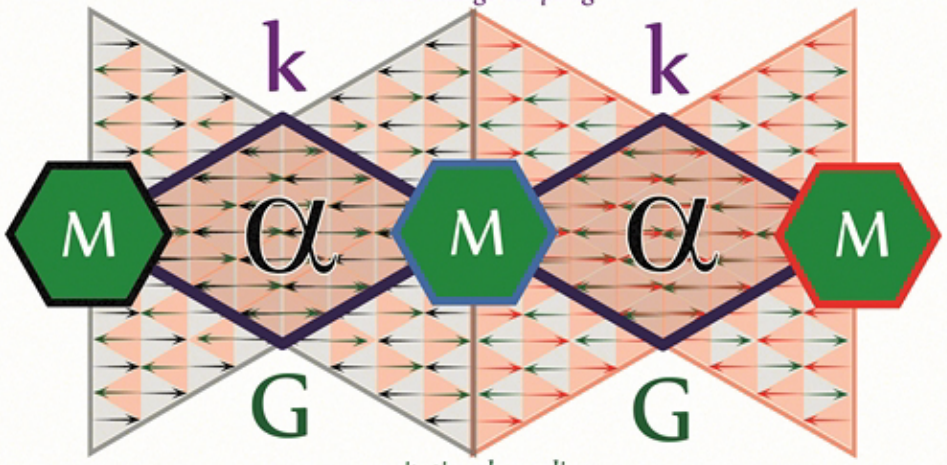
In physics, a coupling constant is a number that determines the strength of an interaction for superpositioned Electrical or Gravitational fields between material objects

Coupling Constants are dimensionless numbers

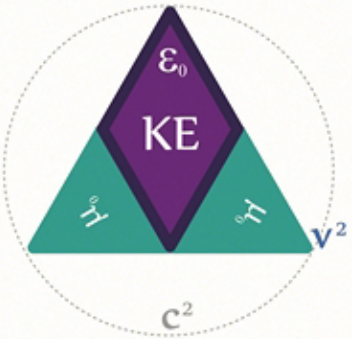
They are reflective of the linear & scalar forces produced by 2D mass-energies

$$\frac{m}{s}\cdot\frac{s}{m}$$

electric charge coupling



gravitational coupling



$$\frac{m^2}{s^2}\cdot\frac{s^2}{m^2}$$

Usually the Lagrangian or the Hamiltonian of a system can be separated into a kinetic part and an interaction part.
[For example, the electric charge of a particle is an Electrical coupling constant]

Opposites
ATTRACT

ElectroMagnetic Charge

[the universal coupling constant]

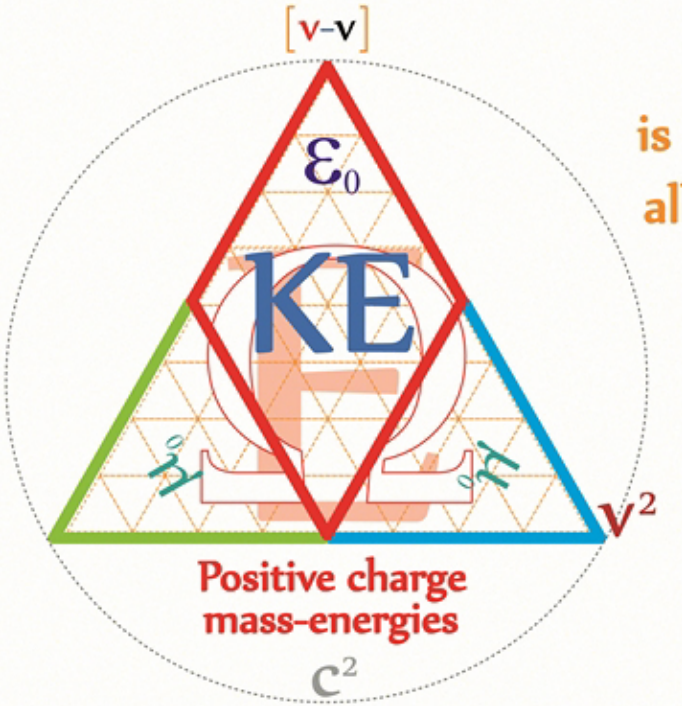
Similars
REPEL

1.33518 e-20 C

Q

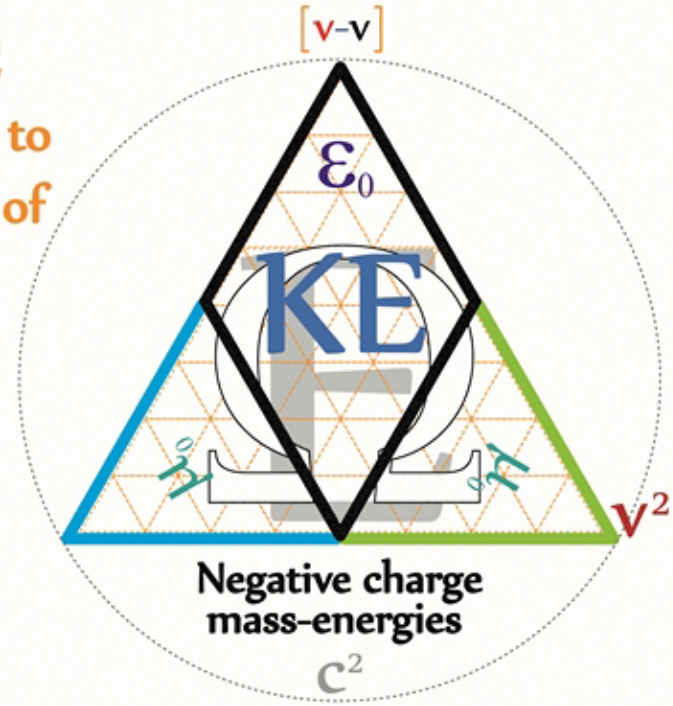
1.33518 e-20 C

Electric charge is a physical property of matter that causes it to experience a force when near other electrically charged matter.
Electric charge comes in two types, called positive and negative



ElectroMagnetic CHARGE is the equilateral foundation to all the quantum geometries of mass-ENERGY-Matter

$$m\Omega v^2 / c^2$$



seconds

Changing charge geometries are equivalent to TIME in relativity

seconds

The electric charge is a fundamental conserved property of all subatomic particles, which determines their electromagnetic interaction.
The interaction between a moving charge and an electromagnetic field is the source of the electromagnetic force, which is one of the four fundamental forces

The equilateral geometry of Planck energies creates CPT symmetries in physics, and provides the foundation for all Matter geometries and their fields of interaction

Einstein–Podolsky–Rosen paradox

was a thought experiment that attempted to challenge the Copenhagen interpretation of Quantum physics

Tetryonics provides a complete model of all Energy forms and Wave-Particle interactions, allowing a clear understanding of previously mysterious actions and processes in Quantum Mechanics

Albert Einstein

(14 March 1879 – 18 April 1955)

Showing that it is possible to know the both Position and Momenta of Particles and to model EM wave geometries and interactions in Quantum Physics

Boris Yakovlevich Podolsky

(1896–1966)

Δx

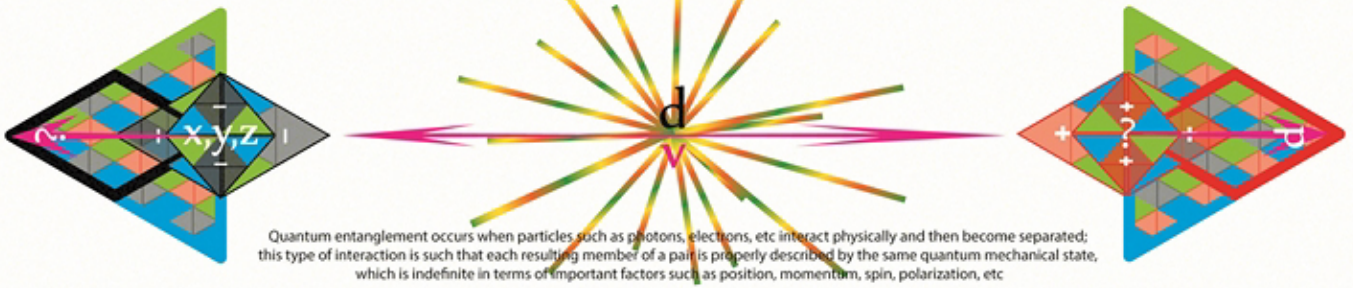
Δp

Nathan Rosen

(March 22, 1909 – December 18, 1995)

The EPR experiment involved two systems that initially interact with each other and are then allowed to separate before being measured.

Measuring the Position of the Electron determines the Position of the Positron



Measuring the Momentum of the Positron determines the Momentum of the Electron

Quantum entanglement occurs when particles such as photons, electrons, etc interact physically and then become separated; this type of interaction is such that each resulting member of a pair is properly described by the same quantum mechanical state, which is indefinite in terms of important factors such as position, momentum, spin, polarization, etc

The EPR paper shows that measuring one feature of a entangled system, e.g., the momentum of one of the pair of particles, will reveal the same feature of the other particle - thus providing a mechanism for determining both the momentum and position of both particles simultaneously

Thus providing a theoretical indication that either the Uncertainty Principle was incorrect or that our understanding of Quantum Mechanics was incomplete

Spooky interactions-at-a-distance & the transfer of information

Quantum entanglement is sasid to occur when particles such as photons, electrons, and other forms of EM mass-energies interact physically and then become separated; the type of interaction is such that each resulting member of a pair is properly described by the same quantum mechanical description (state), which is indefinite in terms of important factors such as position, momentum, spin, polarization, etc.

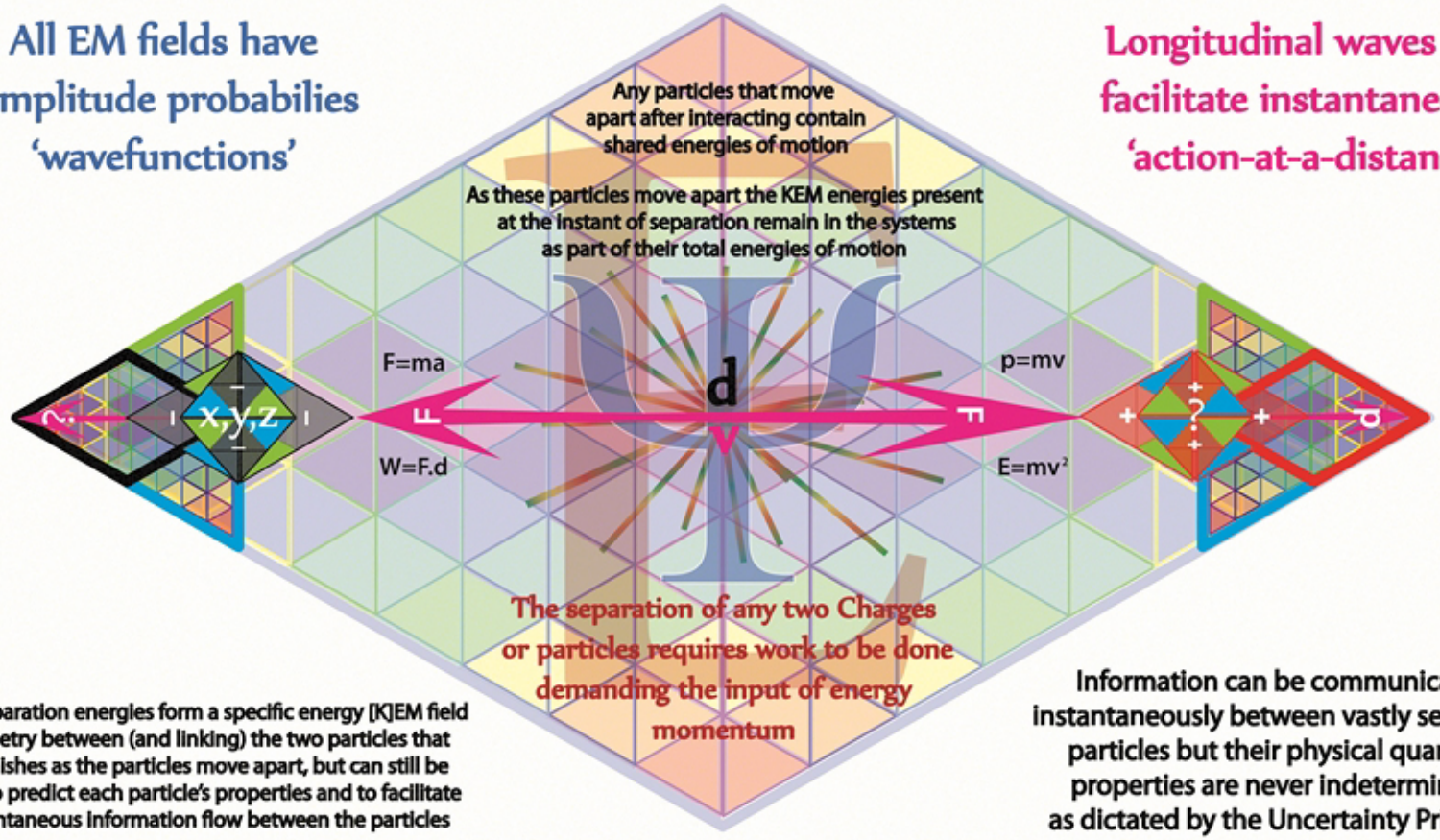
Through the equilateral geomtry of Tetryonics the mass-energy-Matter of any system of particles can be modelled in order to reveal the true EM mechanics of their quantum interactions

alice

bob

All EM fields have amplitude probabilies 'wavefunctions'

Longitudinal waves can facilitate instantaneous 'action-at-a-distance'



The separation energies form a specific energy [K]EM field geometry between (and linking) the two particles that diminishes as the particles move apart, but can still be used to predict each particle's properties and to facilitate instantaneous information flow between the particles

Information can be communicated instantaneously between vastly separated particles but their physical quantum properties are never indeterminant as dictated by the Uncertainty Principle

When two entangled particles are separated using longitudinal energies, the energy momenta of separation provides a mechanism for the establishment and near-instantaneous communication of the physical wavefunction/properties of one particle to the other, irrespective of the spatial or temporal [space-time] separation of the two 'entangled' partner particles