

Unified Absolute Relativity Theory N2

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Derivation and meaning of the fine structure constant

For a stable orbit an electron must have an integer number of Compton wavelengths.
The inverse fine structure constant is the number of Compton wavelengths of the electron that makes the perimeter of the orbit.

The fundamental orbit:

$$\text{Perimeter} = 137.036x_e = 2\pi \cdot R_B$$

x_e -- Electron Compton wavelength; R_B -- Bohr radius.

This number of wavelengths gives a minimum energy.

Potential energy:

$$E_P = m_e g R_B \quad \text{and} \quad g = \frac{q_e^2}{4\pi \epsilon_0 R_B^2 m_e}$$

m_e – Electron mass; g – Acceleration; q_e – Electric charge; ϵ_0 Vacuum permittivity.

$$\Leftrightarrow E_P = \frac{q_e^2}{2\epsilon_0 137x_e}$$

Kinetic energy:

$$E_K = \frac{1}{2} m_e \frac{c^2}{137^2}$$

Total energy:

$$E = \frac{m_e c^2}{2n^2} - \frac{q_e^2}{2\epsilon_0 x_e n}$$

For a minimum of energy:

$$\frac{dE}{dn} = 0$$

$$\frac{dE}{dn} = \frac{q_e^2}{2\epsilon_0 x_e n^2} - \frac{m_e c^2}{n^3} = 0$$

$$\Leftrightarrow n = \frac{2m_e c^2 \epsilon_0 x_e}{q_e^2} = 137.036$$

Why the value is not an integer?
Because the electron has a double orbit.

Double orbit of the electron

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

f – Frequency; f_R -- Rydberg frequency.

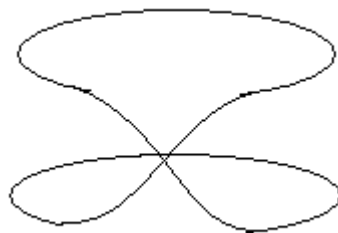
$$f_R = \frac{c}{2x_e 137^2} = 3.3 \times 10^{15} \text{ Hz}$$

Orbital frequency:

$$f_O = \frac{v}{\text{perimeter}} = \frac{c}{x_e 137^2} = 6.6 \times 10^{15} \text{ Hz}$$

$$f_R = \frac{f_O}{2} \quad \Leftrightarrow \quad t_R = 2t_O$$

The Rydberg period is two times the orbital period.
That means the electron has a double orbit.



It's why the giromagnetic ratio is two times than the classical value.

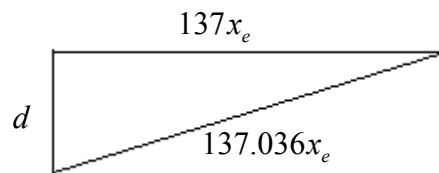
$$\gamma_e = \frac{\text{momentum}}{\text{angular..momentum}} = \frac{q_e}{2m_e} g_e$$

The usual magnetic moment is only a momentum. We will prove this.

$$g_e = 2 + \frac{1}{\pi 137} = 2.00232$$

$$\gamma_e = 1.761 \times 10^{11} ; \quad \frac{1}{\gamma_e} = 5.68 \times 10^{-12} m$$

$$\frac{1}{\gamma_e x_e} = \frac{m_e}{q_e x_e} = 2.34$$



$$d = \pi .x_e$$

$$137.036 = \sqrt{137^2 + \pi^2}$$

The quantum mystery is a classical evidence.

Magnetic dipole moment problem

The magnetic dipole moment of the electron is only a momentum. SI units.

Particle	MDM
Electron	$9.284764 \times 10^{-24} J / T$
Proton	$1.4106067 \times 10^{-26}$
Neutron	9.66236×10^{-27}
Muon	$4.4904478 \times 10^{-26}$

True magnetic dipole moment of the electron:

$$\mu_e = q_m x_e = \frac{hx_e}{2q_e} = 5.0165 \times 10^{-27} \text{ Weber.meter}$$

q_m – Magnetic charge; x_e – Compton wavelength; h – Planck constant; q_e – Electric charge.

Momentum of the electron in hydrogen atom:

$$p_e = \frac{m_e c}{137.036} \left(1 + \frac{\epsilon_0}{x_e} \right) \left(1 + \frac{m_e c^2 \mu_0^2}{\epsilon_0^2} \right) = 9.28 \times 10^{-24}$$

Energy of the quantum of the vacuum:

$$E_0 = \frac{\epsilon_0^2}{\mu_0^2} = 310 \text{ MeV}$$

Momentum of the electron:

$$p_e = q_e A_e = I \cdot \text{Area} = 9.27485 \times 10^{-24}$$

q_e – Electric charge; A_e – Magnetic potential; I – Electric current; c – Light speed

$$A_e = \frac{cx_e}{4\pi}$$

$$q_e \frac{cx_e}{4\pi} = I \cdot \text{Area} = q_e f_e \pi \cdot R^2 \quad \text{and} \quad R = \frac{x_e}{2\pi}$$

f_e -- Electron Compton frequency

$$q_e \frac{cx_e}{4\pi} = q_e f_e \frac{x_e^2}{4\pi} \quad \Leftrightarrow \quad x_e = \frac{c}{f_e}$$

So, an electric current times an area is a momentum, not a magnetic dipole moment.~
This is a proof of our theory of units unification.

True magnetic dipole moment of the particles:

The magnetic dipole moment is a magnetic charge times a distance.

$$\mu = q_m x ; \quad q_m = 2.0678 \times 10^{-15} \text{ Weber}$$

Proton:

$$\mu_P = q_m x_P = 2.73 \times 10^{-30}$$

Neutron:

$$\mu_N = q_m x_N = 2.86 \times 10^{-32}$$

Muon: $\mu_\mu = 2.43 \times 10^{-29}$

The Aether Quantum

The aether is the gravitational field of the universe. Any planet or star has its own aether.

The aether is an electromagnetic medium. The quantum of the aether is a particle that behaves as a black hole.

The aether is a superfluid and a superconductor.

The magnetic and electric fields are speeds of the movement of those particles.

For very high frequencies the vacuum behaves as a plasma.

Energy:

$$E_0 = \left(\frac{\epsilon_0}{\mu_0} \right)^2 = 310 \text{ MeV}$$

Density:

$$\rho_0 = \frac{1}{\mu_0} = 7.958 \times 10^5 \text{ kg} / \text{m}^3$$

Volume:

$$V_0 = \epsilon_0^3 = 6.941 \times 10^{-34} \text{ m}^3$$

Mass:

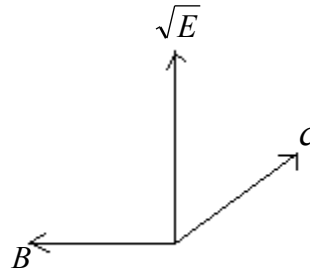
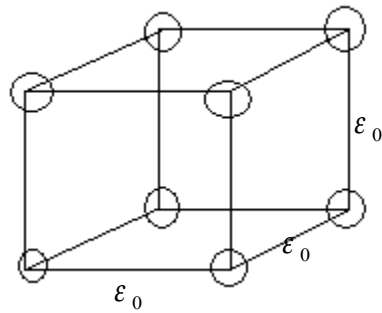
$$m_0 = \frac{E_0}{c^2} = \rho_0 V_0 = 5.524 \times 10^{-28} \text{ kg}$$

Is a superconductor:

$$c^2 = \frac{G_0 m_0}{\epsilon_0} \quad \text{and} \quad G_0 = \frac{1}{\epsilon_0^3}$$

Wavelength:

$$x_0 = \frac{h}{cm_0} = 4 \times 10^{-15} \text{ m}$$



$$\text{Speed} = B = \sqrt{E}$$

The vacuum is a cubic lattice of the quantum.

Total energy of the aether:

$$310 \text{ MeV} \text{ ----- } \epsilon_0^3$$

$$E_T \text{ ----- } V_U = \frac{4}{3} \pi .R_U^3 = 9.3 \times 10^{78}$$

$$E_T = 4.2 \times 10^{120} eV$$

As the particles are black holes this energy has no gravitational effects.

What is the mass of a particle?

The mass is the electric dipole moment.

The gravitational force is the electric force between electric dipoles.

The gravitational potential is an electric field.

$$\text{Coulomb} \times \text{meter} = \text{kilogram}$$

Mass = EDM

$$m = \frac{Q.k_B}{d}$$

m – Mass; Q – Electric charge; k_B -- Boltzmann constant; d – Distance between the charges.

For the electron:

$$m_e = \frac{q_e k_B}{x_e} \quad \Leftrightarrow \quad q_e k_B c \approx h$$

q_e -- Electron charge; x_e -- Electron Compton wavelength; h -- Planck constant; c -- Light speed.

This formula is valid for all particles with their own wavelength.
The mass has the sign of the charge.

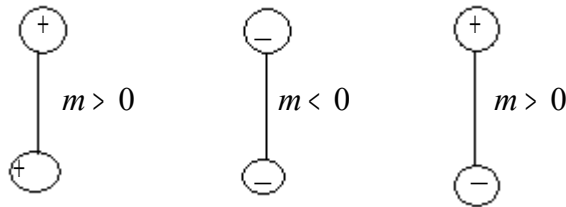
In our new system of SI units:

L – Distance; V – Speed

$$m = L^4 V^2; \quad q = L^3 V^2; \quad k_B = L^2; \quad x = L; \quad h = L^5 V^3; \quad c = V$$

The entropy is an area like in black holes.

There are three types of mass or dipoles, positive, negative and neutral:



The electron has negative mass.

The neutral mass attracts all other masses.

The negative and positive masses behave like the charges.

Mass of the Cooper pair

The extra mass of the Cooper pair is the electric dipole moment of the dipole.

Electric and unified forces:

$$\frac{q_e^2}{4\pi \epsilon_0 R^2} = \frac{Shf^4}{c^3}$$

Cooper pair distance:

$$R = 1.45 \times 10^{-8} m$$

Mass of the dipole:

$$m = \frac{q_e k_B}{R} = 1.525 \times 10^{-34} kg$$

$$\frac{2m_e + m}{2m_e} = 1.0000837$$

Experimental value: (m_C -- Cooper pair mass)

$$\frac{m_C}{2m_e} = 1.00008421$$

This is a proof that the mass is the electric dipole moment.
This is also a proof of our unified force formula.

Distance of the Cooper pair:

$$R = \frac{x_e}{\pi \alpha^2} = 1.45 \times 10^{-8} m ; \quad \alpha \text{ -- Fine structure constant}$$

Binding energy of the Cooper pair:

$$E = \frac{q_e^2}{4\pi \epsilon_0 R} = 0.1eV$$

Temperature of the Cooper pair:

$$E = 0.1eV = k_B T$$

$$\Leftrightarrow T < 1.16 \times 10^3 K = 887^\circ C$$

Superconductivity is possible at 887°C

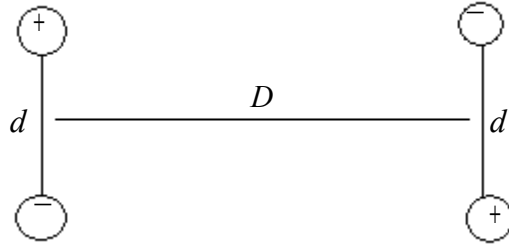
Neutrino mass

$$m_\nu = q_e \sqrt{S} = 2.2 \times 10^{-36} kg$$

$$\frac{m_e}{m_\nu} = \frac{\alpha^{-3}}{2\pi} \quad \text{me -- Electron mass}$$

Gravitational force unification

All forces are electromagnetic.
The gravitational force is the electric force between electric dipoles.



Force between two dipoles:

$$F = \frac{q_e^2 d^2}{2\pi \epsilon_0 D^4} \quad \text{and} \quad d^2 = n^2 \Delta D^2$$

$$\Delta^2 F = \frac{q_e^2 n^2 \Delta D^2}{2\pi \epsilon_0 D^4}$$

$$F = \frac{q_e^2 n^2}{2\pi \epsilon_0} \int \int \frac{\Delta D^2}{D^4} = \frac{q_e^2 n^2}{12\pi \epsilon_0 D^2}$$

q_e -- Electric charge; d – Distance between poles; n – Number of dipoles in one direction; ϵ_0 -- Vacuum permittivity; D – Distance between dipoles.

$$F = \frac{q_e^2 n^2}{12\pi \epsilon_0 D^2} = G \frac{M^2}{D^2} ; \quad M = n^3 m = n^3 \frac{q_e k_B}{d}$$

$$n = M \frac{\sqrt{12\pi \epsilon_0 G}}{q_e} ; \quad \text{Total number of dipoles} = N = n^3$$

$$F = G \frac{M^2}{D^2} = \frac{G}{D^2} \frac{n^6 q_e^2 k_B^2}{d^2} = \frac{q_e^2 n^2}{12\pi \epsilon_0 D^2}$$

$$\Leftrightarrow \quad d = M^2 k_B \frac{(12\pi \epsilon_0 G)^{3/2}}{q_e^2}$$

Values for one dipole:

$$N = 1 \quad \Leftrightarrow \quad M = 1.07 \times 10^{-9} \text{ kg} = M_p / 20$$

$$M_p = \text{Planck..mass} = \sqrt{\frac{hc}{2\pi \cdot G}}$$

$$d = k_B \sqrt{12\pi \epsilon_0 G} = 2.06 \times 10^{-33} m = 40\pi .L_P$$

$$L_P = \text{Planck..length} = \sqrt{\frac{hG}{2\pi .c^3}}$$

Values for M = 1kg

$$N = n^3 = 8.1 \times 10^{26} ; \quad d = 1.8 \times 10^{-15} m$$

Loschmidt constant:

$$n_0 = 2.7 \times 10^{25}$$

$$N/n_0 = 30$$

The proton is the quantum of macroscopic mass.

The values of n are quantized.

Some relations:

$$M = M_p / 20 \quad \Leftrightarrow \quad 20q_e \approx \sqrt{6hc\epsilon_0}$$

$$d = 40\pi .L_P \quad \Leftrightarrow \quad k_B \sqrt{24\epsilon_0 c^3} \approx 40\sqrt{h}$$

$$\frac{k_B \sqrt{24\epsilon_0 c^3}}{40\sqrt{h}} = \frac{\sqrt{6hc\epsilon_0}}{20q_e} = 1 + 2\alpha \quad \Leftrightarrow \quad q_e k_B c = h$$

Gravitational constant between two equal masses

Gravitational constant:

$$G = \frac{q_e^2}{4\pi \epsilon_0 m^2} = \frac{q_e^2 (c^2 - S f^2)^2}{4\pi \epsilon_0 h^2 f^2}$$

For the electron:

$$G_e = 2.78 \times 10^{32} m^{-3}$$

For macro-masses:

$$f = f_M = \frac{c}{\sqrt{S}} = 2.1672 \times 10^{25} \text{ Hz}$$

f_M -- Compton frequency of the macro-matter

$$G_0 = 6.67 \times 10^{-11} = \frac{q_e^2 S}{4\pi \epsilon_0 h^2 c^2} w^4 \quad \Leftrightarrow \quad w = 2.78 \text{ m/s (wave speed)}$$

$$m_0 = \frac{hf_M}{w^2} = 1.86 \times 10^{-9} \text{ kg}; \quad \text{Planck mass} = 2.18 \times 10^{-8} \text{ kg} \quad (w = 1)$$

Macro-masses like stars and planets are also particles.

Permittivity of the gravitational constant:

$$G_0 = 6.67 \times 10^{-11} = \frac{1}{\frac{4}{3}\pi \epsilon_G^3} \quad \Leftrightarrow \quad \epsilon_G = 1.53 \times 10^3 \text{ m}$$

Wave speed:

$$w = \frac{1}{\sqrt{\epsilon_G \mu_0}} = 22.8 \text{ m/s}$$

Earth gravitation:

$$M = 6 \times 10^{24} \text{ kg}; \quad D = 6.4 \times 10^6 \text{ m}$$

$$N_0 = \frac{M}{m_p} = 3.6 \times 10^{51}; \quad m_p \text{ -- Proton mass}$$

$$\text{Number of dipoles per kilogram: } n_0 = 6 \times 10^{26} \text{ kg}^{-1}$$

Total charge:

$$Q = N_0 q_e = 5.75 \times 10^{32} \text{ C}$$

$$k_B q_e n_0 = x_p; \quad x_p \text{ -- Proton wavelength}$$

Electric field of the earth pole at surface:

$$E = \frac{Q}{4\pi \epsilon_0 D^2} = 1.3 \times 10^{29} \text{ V/m}$$

Dipole field:

$$E_{DP} = E \frac{d}{D} = 2.6 \times 10^7 V/m$$

The gravitational potential is the electric field:

Gravitational potential:

$$E_{DP} = \frac{GM}{D} = 6.25 \times 10^7 V/m$$

True gravitational potential

The true gravitational potential is an electric field.

This potential must vary with the distance squared.

The usual gravitational potential is a squared orbital speed, so it's wrong.

$$P_G = E = V^2$$

The gravitational potential is an electric field and a squared speed.

Gravitational potential:

$$P_G = 0.67 \frac{M}{D^2}$$

Speed of gravity

The Compton frequency of the matter is a constant:

$$f_M = \frac{c}{\sqrt{S}} = 2.1672 \times 10^{25} \text{ Hz}$$

Mass:

$$m = \frac{hf_M}{w^2}; \quad w = 1 \quad \Leftrightarrow \quad \text{Planck mass}$$

Earth wave speed:

$$w_E = 4.9 \times 10^{-17} \text{ m/s}$$

Group speed:

$$V_E = \frac{c^2}{w_E} = 1.84 \times 10^{33} \text{ m/s}$$

Speed of the gravity:

$$V_G = 7.5 \times 10^{20} \sqrt{m}$$

For the universe:

$$m = 1 \times 10^{53} \text{ kg}; \quad \Leftrightarrow \quad V_{GU} = 2.37 \times 10^{47} \text{ m/s}$$

We feel the centre of the universe with a delay of: $5.5 \times 10^{-22} \text{ s}$

Cross section of the Earth graviton (a photon):

$$x^2 = 5.1 \times 10^{-84} \text{ m}^2$$

It's almost impossible to stop gravity. But we can get matter with zero mass.

Casimir force

The Casimir force is the electric force between neutral electric dipoles, so it's gravity.

$$F = \frac{\pi \cdot h \cdot c \cdot A}{480 D^4}$$

Electric force between two dipoles:

$$F = \frac{q_e^2 d^2}{2\pi \epsilon_0 D^4} \quad \text{and} \quad d^2 = \pi \cdot A$$

d – Distance between the poles; A – Area

$$\frac{q_e^2}{2\pi \epsilon_0} \approx \frac{hc}{480}$$

True equation of the force:

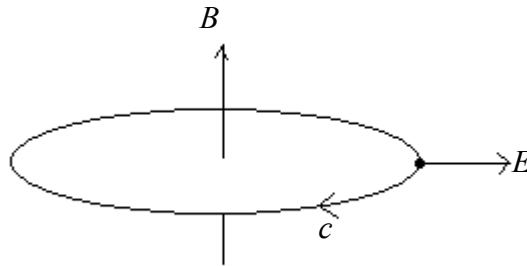
$$F = \frac{h \cdot c \cdot \alpha \cdot A}{D^4}; \quad \alpha \text{ -- Fine structure constant.}$$

A particle is a rotating wave

There are only two fundamental particles: the electron and the neutrino.

The electron is the electric monopole and the neutrino is the magnetic monopole.
 The particles are rotating waves on their own electric or magnetic fields. A particle is a half wave more some potential energy.
 The electron has two magnetic charges and the neutrino has two electric charges.

The electron:



Gyroradius:

$$R = \frac{mv}{qB} \quad \Leftrightarrow \quad R^2 = \frac{mvR}{qB} \quad \text{and} \quad mvR = h/2\pi$$

$$R = 3.86 \times 10^{-13} m = x_e / 2\pi$$

B – Magnetic field; E – Electric field.

$$f_e = \frac{qB}{2\pi \cdot m_e} ; \quad f_e \text{ -- Compton frequency}$$

$$B = 4.416 \times 10^9$$

Magnetic charge:

$$q_m = B\pi \cdot R^2 \quad \text{and} \quad q_m = \frac{h}{2q_e}$$

Acceleration and force:

$$g = \frac{2\pi \cdot c^2}{x_e} ; \quad F = mg$$

And
$$F = \frac{q_m q_e c}{\pi \cdot R^2}$$

Energy:

$$E_y = FR = \frac{ch}{2\pi \cdot R} = 0.511MeV$$

Electric field:

$$q_e = E \frac{4}{3} \pi \cdot R^3 \quad \Leftrightarrow \quad E = 6.651 \times 10^{17} V / m$$

$$\frac{E}{B} = \frac{c}{2}$$

The Zitterbewegung of the electron is a proof that it is a spinning wave.

The spin of the electron is totally classical.

$$S_e = \frac{h}{4\pi} = \frac{m_e}{2} Rv = \frac{m_e}{2} \frac{x_e}{2\pi} c$$

$$S_e = I_e \omega_e \quad \text{and} \quad \omega_e = 2\pi \cdot f_e$$

Electron moment of inertia:

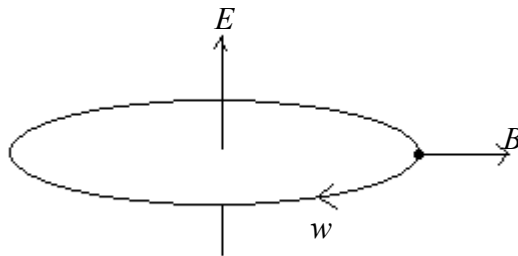
$$I_e = \frac{m_e}{2} R^2$$

So, the mass of the electron is in a solid disc.

$$S_e = \frac{me}{2} R^2 2\pi f_e = \frac{h}{4\pi}$$

The problem of the orientation of the electron when rotated that must be 720° is because the electron in hydrogen atom has a double orbit – the known factor of about 2.

The neutrino:



$$R = \frac{\sqrt{S}}{2\pi} = 2.2 \times 10^{-18} m$$

Wave speed:

$$w = 2.18 \times 10^{19} m/s$$

Electric field:

$$E = 3.584 \times 10^{33} V/m$$

Magnetic field:

$$B = 1.358 \times 10^{20} T$$

Force formula:

$$F = \frac{4q_m v R E}{3} \quad \text{and} \quad F = \frac{m v^2}{R}$$

Longitudinal waves have speeds much greater than light speed because the vacuum for very high frequencies behaves as a plasma.

Maxwell equations are wrong

All that exists is electromagnetism.

The Maxwell equations are wrong because the electric and magnetic fields are in phase.

To keep the energy conservation law, in any wave, the fields must have a shift of 90°, being in quadrature.

Electric and magnetic wave equations:

$$E = E_0 \cos(kx - wt) ; \quad B = B_0 \sin(kx - wt)$$

$$\Leftrightarrow \frac{d^2 E}{dx^2} = \frac{1}{c^2} \frac{d^2 E}{dt^2} \quad \text{and} \quad \frac{d^2 B}{dx^2} = \frac{1}{c^2} \frac{d^2 B}{dt^2}$$

$$A \left\{ \begin{array}{l} \frac{dE}{dx} = \frac{\rho_e}{\epsilon_0} \\ \frac{dB}{dx} = \rho_m \end{array} \right.$$

$$B1 \left\{ \begin{array}{l} k \frac{dB}{dt} = \frac{d^2 E}{dx^2} + \rho_m^2 \\ - \frac{dB}{dx} c^2 w = \frac{d^2 E}{dt^2} + J_m^2 \end{array} \right.$$

$$\text{B2} \quad \begin{cases} k \frac{dE}{dt} = -c^2 \frac{d^2 B}{dx^2} + \rho_m J_m \\ w \frac{dE}{dx} = \frac{d^2 B}{dt^2} + \rho_m J_m \end{cases}$$

ρ_e -- Electric charge volume density; ρ_m -- Magnetic charge volume density.

J_m -- Magnetic current area density.

Probably it's necessary to change the constant light speed by the variable wave speed.

With imaginary wavelengths and speeds we have longitudinal waves.

Maxwell and Schrodinger equations must be unified.

Force formula:

$$F = q_e (E + vB) + \frac{q_m}{\mu_0} \left(B - v \frac{E}{c^2} \right)$$

Meaning of the wave function from quantum mechanics

The exact meaning of the wave function Ψ is not a probability amplitude but a magnetic potential A .

In the Schrodinger equation:

$$\frac{d\Psi}{dt} = -i2\pi f\Psi \quad \text{and} \quad \frac{d\Psi}{dx} = i \frac{2\pi}{\lambda} \Psi$$

The electric and magnetic fields from magnetic potential are:

$$\vec{E} = \frac{dA}{dt} \quad \text{and} \quad \vec{B} = \frac{dA}{dx}$$

If $\Psi = A$:

$$\begin{cases} E = -i2\pi f\Psi \\ \vec{B} = i \frac{2\pi}{\lambda} \Psi \end{cases} \Leftrightarrow \frac{E}{B} = -\lambda f \Leftrightarrow$$

$$\Leftrightarrow \frac{E}{B} = -c \quad (\text{Light speed})$$

And we know that for an electromagnetic wave: $\frac{E_M}{B_M} = c$

So, **THE WAVE FUNCTION IS A MAGNETIC POTENTIAL.**
Magnetic vector potential equation

$$A = A_0(\cos(kx - wt) + i \sin(kx - wt))$$

$$A' = A_0(\cos(kx - wt) - i \sin(kx - wt))$$

$$AA' = A_0^2$$

$$A = A_0 e^{i(kx - wt)}$$

$$\frac{dA}{dt} = A_0 e^{i(kx - wt)} (-iw)$$

$$\frac{d^2 A}{dx^2} = A_0 e^{i(kx - wt)} (-k^2)$$

$$\frac{dA}{dt} = iA_0 \frac{d^2 A}{dx^2} \quad ; \quad A_0 = \frac{c\lambda}{2\pi}$$

Simplified Schrodinger equation:

$$\frac{dA}{dt} = iA_0 \frac{d^2 A}{dx^2} + v^2$$

$v^2 = \text{Gravitational potential} = \text{Electric field}$

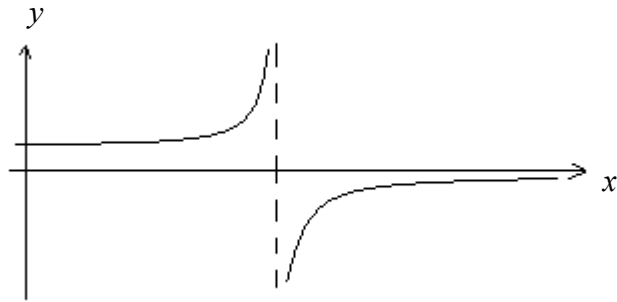
How nature deals with mathematical infinities

In nature there are no infinities.

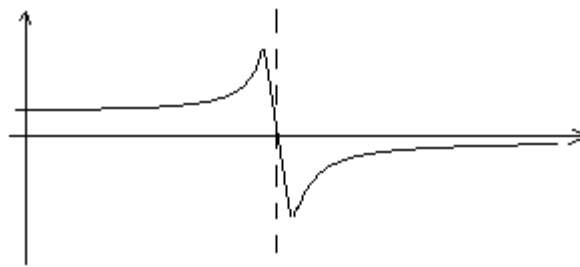
When a mathematical equation has an asymptote value of infinity the true natural value is zero. This is renormalization.

Mathematical behaviour:

$$y = \frac{1}{1-x}$$



Natural behaviour:



Natural equation:

$$y = \frac{1-x}{(1-x)^2 + a} ; \quad a \ll 1$$

x for maximum and minimum:

$$x_M = 1 \pm \frac{\sqrt{a}}{2}$$

y maximum and minimum:

$$y_M = \pm \frac{2}{5\sqrt{a}}$$

Double sonic boom

Doppler formula for sound pressure:

$$P = P_0 \frac{c}{c - v} ; \quad P_0 = 1.atm ; \quad c = 340 \text{ m/s}$$

Real formula:

$$P = P_0 \frac{c(c - v)}{(c - v)^2 + a} ; \quad P_{MX} = 14.2atm(at..20cm)$$

Michelson experiment

The Michelson experiment was made for detecting the relative speed of the experimental device to the vacuum. We know that the earth is moving in the space so, if the light speed is relative, we can be able to detect this movement.

So, is necessary that the light in the device propagates in the vacuum. But that is impossible at earth surface because the light moves in the earth gravitational field that is at rest relatively to the device.

But there's another problem with the experiment. The light is not moving in the vacuum neither in the earth gravitational field, **it is moving in the air**.

How can we detect the movement relatively to the vacuum if the light propagates in the air.

And this experiment is the only experimental basis for light speed constancy.

That's the problem with null result experiments. The experiment can be wrong and we still get the expected result.

If we measure the wind speed inside of a moving car we get zero speed, so the air doesn't exist.

Hydrogen Classical Wavelengths and Intensities

Wavelengths:

$$\frac{1}{\lambda} = R_H \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) ; \quad R_H = 1.09737316 \times 10^7$$

n_2	n_1	<u>Relative intensity</u>	<u>Wavelength (nm)</u>
9	2	5	383.5384
8	2	6	388.9049

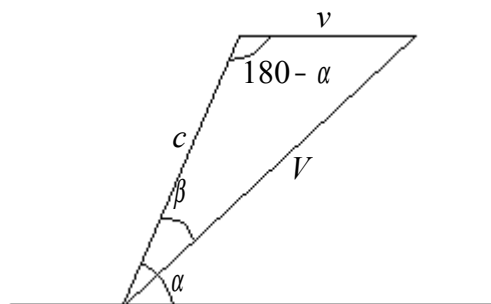
7	2	8	397.0072
6	2	15	410.174
5	2	30	434.047
4	2	80	486.133
3	2	180	656.2852
7	4	5	2165.53
6	4	8	2625.15
5	4	15	4051.16
7	5	4	4652.51
6	5	6	7457.8
7	6	3	12368.5

Intensity formula:

$$I = \frac{\text{const } \tan t}{(n_1 + 1)^2 (n_2 + 1)^4}$$

Is Light Speed Relative or Not?

This is a test of the relativity postulate of light speed constancy, based on the phenomenon of the astronomical aberration.



$$\frac{V}{\sin(180 - \alpha)} = \frac{v}{\sin \beta} \quad \Leftrightarrow \quad \sin \beta = \frac{v}{V} \sin \alpha$$

β = Astronomical aberration

Classical V:

$$V_C = \sqrt{c^2 + v^2 + 2vc \cos \alpha}$$

Relativistic V:

$$V_R = c$$

We have a maximum $\Delta \beta$ for $\alpha = \pi / 4$; $v = 3 \times 10^4$

$$V_C = 2.99813672 \times 10^8$$

$$V_R = 2.99792458 \times 10^8$$

$$\beta_C = \frac{v}{V_C} \sin(\pi / 4) = 7.07546233 \times 10^{-5} \text{ rad} = 14.5942''$$

$$\beta_R = \frac{v}{c} \sin(\pi / 4) = 7.07596301 \times 10^{-5} \text{ rad} = 14.5952''$$

$$\Delta \beta = 1 \times 10^{-3}''$$

If it's possible to measure those angles with this precision, we can for the first time to test the light speed constancy postulate.

Cosmic microwave background radiation

The big-bang never happens.

The cosmic radiation is generated by the universe rotation.

Gravitational field of the universe:

$$g_U = \frac{GM_U}{R_U^2} = 6.9 \times 10^{-10} \text{ m/s}^2$$

Frequency of the radiation:

$$f = \frac{k_B 2.7}{h} = 5.6 \times 10^{10} \text{ Hz}$$

Acceleration field of the photon:

$$g = \frac{Sf^3}{c}$$

The acceleration field of the photon is equal to the acceleration of the universe:

$$\frac{g_U}{2\pi} = \frac{Sf^3}{c}$$

Relation wave speed and wavelength:

$$w = \frac{cx}{\sqrt{S + x^2}}$$

$$\frac{dw}{dx} = f_R = \frac{Sf^3}{c^2} \quad \Leftrightarrow$$

$$\Leftrightarrow \frac{H_0}{2\pi} = \frac{S}{c^2} \left(\frac{k_B T}{h} \right)^3$$

$H_0 = 2.3 \times 10^{-18} \text{ Hz}$ -- Hubble constant; $T = 2.7\text{K}$

Those relations are very important and must be studied.

Visible light in glass

This calculation is an approximation because v is not a constant.

$$w = c^2 \frac{\sqrt{c^2 - kf_0^2} + v}{c^2 + v\sqrt{c^2 - kf_0^2}}$$

$$\frac{dw}{df_0} = -c^2 kf_0 \frac{c^2 - v^2}{\left(c^2 + v\sqrt{c^2 - kf_0^2} \right)^2 \sqrt{c^2 - kf_0^2}}$$

$$f = \frac{cf_0 \sqrt{c^2 - v^2}}{c^2 + v\sqrt{c^2 - kf_0^2}} \Leftrightarrow c^2 - v^2 = \frac{f^2 \left(c^2 + v\sqrt{c^2 - kf_0^2} \right)^2}{c^2 f_0^2}$$

$$\frac{dw}{df_0} = - \frac{kf_0^2}{f_0 \sqrt{c^2 - kf_0^2}} \Leftrightarrow \frac{dw}{df_0} = - \frac{c^2 - w^2}{f_0 \sqrt{c^2 - kf_0^2}}$$

$$\frac{dw}{c^2 - w^2} = - \frac{df_0}{f_0 \sqrt{c^2 - kf_0^2}} \Leftrightarrow$$

$$\Leftrightarrow \frac{1}{2c} \log \left| \frac{c+w}{c-w} \right| = - \frac{1}{c} \log \left| \frac{c - \sqrt{c^2 - kf_0^2}}{\sqrt{k} f_0} \right| + C$$

$$\frac{c+w}{c-w} \frac{kf_0^2}{\left(c + \sqrt{c^2 - kf_0^2} \right)^2} = R$$

Reference frequency and speed:

$$f_{0S} = 5 \times 10^{14} ; \quad n = 1.5 ; \quad n = \frac{c}{w_S}$$

$$R = \frac{n+1}{n-1} \frac{kf_{0S}^2}{4c^2} ; \quad w = c \frac{R \left(c + \sqrt{c^2 - kf_0^2} \right)^2 - kf_0^2}{R \left(c + \sqrt{c^2 - kf_0^2} \right)^2 + kf_0^2}$$

$$f_0 < 1 \times 10^{20} \Leftrightarrow \sqrt{c^2 - kf_0^2} \approx c$$

Approximated formula of light speed in glass

$$w = c \frac{1.25 \times 10^{30} - f_0^2}{1.25 \times 10^{30} + f_0^2}$$

f_0 in the air and w in the glass

Frequency of the light in the glass

$$w = c^2 \frac{w_0 - v}{c^2 - vw_0} ; \quad w_0 = c - \Delta w_0 ; \quad v = c - \Delta v$$

$$w = c \frac{\Delta v - \Delta w_0}{\Delta v + \Delta w_0} ; \quad \frac{c}{1.5} = c \frac{\Delta v - \Delta w_0}{\Delta v + \Delta w_0}$$

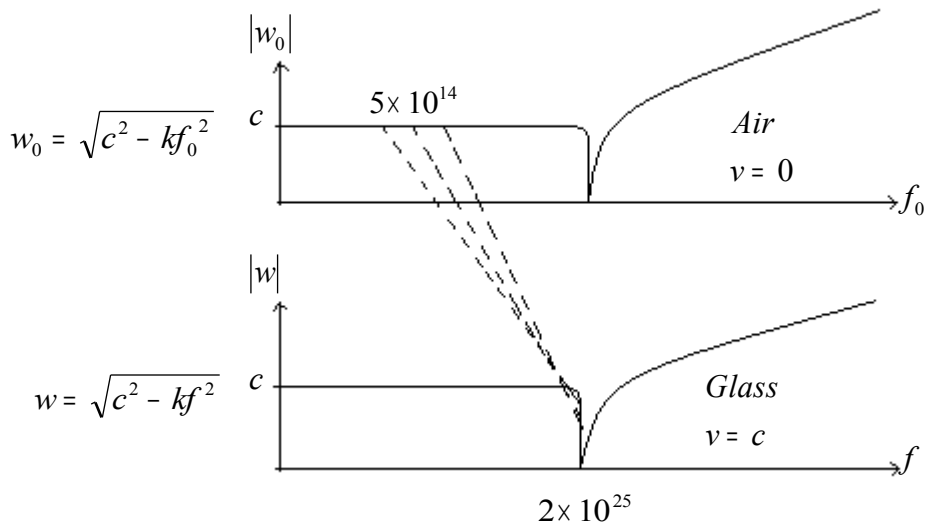
$$\Delta v = \frac{2.5}{0.5} \Delta w_0 \quad \text{and} \quad \Delta w_0 = \frac{kf_0^2}{2c}$$

$$\Delta v = 4 \times 10^{-13} \quad \Leftrightarrow \quad v = c - \Delta v \approx c$$

$$f = \frac{cf_0 \sqrt{c^2 - v^2}}{c^2 - vw_0} \quad \Leftrightarrow \quad f = f_0 \sqrt{\frac{2c}{\Delta v}}$$

$$f_0 = 5 \times 10^{14} \text{ Hz} \quad \Leftrightarrow \quad f \approx 2 \times 10^{25} \approx f_M = \frac{c}{\sqrt{k}}$$

Inside the glass the visible light behaves like high frequency gamma rays.
As $v = c$, the glass behaves like a black hole.



If we use x-rays in the air, inside the glass we have longitudinal waves with speeds greater than light speed, as proved by experiment.

$$f_0 = 1 \times 10^{18} \text{ Hz}; \quad \Delta v = 4 \times 10^{-13}$$

$$f = f_0 \sqrt{\frac{2c}{\Delta v}} \quad \Leftrightarrow \quad f = 3.87 \times 10^{28} \text{ Hz}$$

$$w = \sqrt{c^2 - kf^2} \quad \text{and} \quad k = 1.9 \times 10^{-34}$$

$$\Leftrightarrow \quad w = i5.3 \times 10^{11} = i1786 \times c$$

Dark Matter are Death Stars

Mass of the local universe:

$$M_U = 1.75 \times 10^{53} \text{ kg}$$

Period of rotation of the universe:

$$T_U = 4.3 \times 10^{17} \text{ s}$$

Lifetime of a star:

$$t = 3.2 \times 10^{17} \text{ s}$$

Total number of stars:

$$N_T = 8.8 \times 10^{22}$$

Live stars -- 16.7% -- $N_L = 1.5 \times 10^{22}$

Death stars -- 83.3% -- $N_D = 7.3 \times 10^{22}$

True age of the local universe:

$$T_0 = \frac{t \cdot N_D}{2} = 1.2 \times 10^{40} \text{ s}$$

The universe is much older than we suspected.

Its why there are galaxies with almost zero dark matter and some has almost only dark matter.

Electric and magnetic forces

Force between two electric charges:

F – force; R – distance; q_e - electric charge; q_m - magnetic charge
 ϵ_0 - vacuum permittivity; μ_0 - vacuum permeability.

$$F_1 R_1^2 = \frac{q_e^2}{4\pi \epsilon_0} = 2.31 \times 10^{-28}$$

Force between an electric and a magnetic charges:

$$F_2 R_2^2 = \frac{q_e q_m}{\pi \sqrt{\epsilon_0 \mu_0}} = 3.161 \times 10^{-26}$$

Force between two magnetic charges:

$$F_3 R_3^2 = \frac{q_m^2}{\mu_0} = 3.4 \times 10^{-24} ; \quad q_m = \frac{h}{2q_e}$$

α - Fine structure constant

$$F_3 R_3^2 / F_2 R_2^2 = \alpha^{-1} \pi / 4$$

$$F_2 R_2^2 / F_1 R_1^2 = \alpha^{-1}$$

$$F_3 R_3^2 / F_1 R_1^2 = \alpha^{-2} \pi / 4$$

Proof of the existence of the constant S

$$S = c^2 t^2 - x^2 ; \quad S = \frac{\pi \cdot x_e^2}{2\alpha^{-5}} = 1.9 \times 10^{-34} m^2$$

x_e - Electron's Compton wavelength; α - Fine structure constant

$i\sqrt{S}$ = Compton wavelength of the neutrino

Magnetic dipole moment of the neutrino:

$$MDM = q_m \sqrt{S} = 3 \times 10^{-9} \mu_B$$

$q_m = \frac{h}{2q_e} =$ Magnetic charge (magnetic flux quantum); $\mu_B =$ Bohr magneton

Experimental value:

$$MDM = (2 \pm 4.8) \times 10^{-10} \mu_B$$

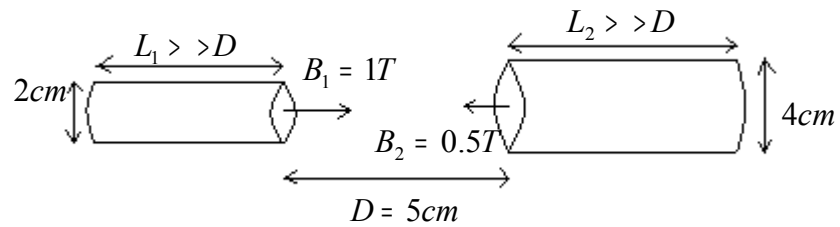
Charge radius:

$$R = \frac{\sqrt{S}}{2\pi} = 2.2 \times 10^{-18} m$$

Experimental value:

$$R = (1 \pm 1.6) \times 10^{-18} m$$

Force between two magnets



Magnetic charge:

$$Q_{m1} = B_1 \pi R_1^2 \quad ; \quad Q_{m2} = B_2 \pi R_2^2$$

$$Q_{m1} = 3.14 \times 10^{-4} \text{Weber} \quad ; \quad Q_{m2} = 6.28 \times 10^{-4} \text{Weber}$$

Magnetic force:

$$F = \frac{Q_{m1} \cdot Q_{m2}}{\mu_0 D^2} = 62.8\text{N} = 6.4\text{kg}$$

$L_1 \gg D$ and $L_2 \gg D$ so the charges are like monopoles.

Magnetic force for dipoles -- $L_1 \leq D; L_2 \leq D$:

$$F = \frac{Q_{m1} \cdot Q_{m2} \cdot \sqrt{L_1 L_2}}{\mu_0 D^3} \quad \text{and} \quad L_1 = L_2 = 1 \text{ cm}$$

$$F = 12.6 \text{ N} = 1.3 \text{ kg}$$

Abraham-Minkowski controversy

Electromagnetic momentum in matter:

$$E = mc^2 = \frac{c^2}{w^2} hf \quad \Leftrightarrow \quad m = \frac{hf}{w^2}$$

$$p = mw = \frac{hf}{w} = \frac{nhf}{c} \quad \text{and} \quad n = \frac{c}{w}$$

Minkowski is correct.

Particle confinement

The confinement energy, calculated with the uncertainty principle formula is not correct.

True formula: $Ex = ch$

E – Energy; x – Wavelength; c – Light speed; h – Planck constant.

A positron confined to the size of a proton is a proton.

Systems of units

Any formula must be equal in any system of units.
Systems of units that change the formulas are wrong.
CGS system and natural units system are incorrect.

