One field for all known forces. Relativity as an exclusively speed problem.

Osvaldo Domann

odomann@yahoo.com

Last revision July 2020

(This paper is an extract of [10] listed in section Bibliography.)

Abstract

Our present standard model is based on basic laws for forces which were mathematically introduced by matching equations with experimentally obtained curves. The basic laws are Coulomb, Ampere, Lorentz, Maxwell, Gravitation, etc. The equations were not deduced mathematically from the interactions of one postulated field, resulting the need to introduce for each particular manifestation of the force a different field, namely electric, magnetic, strong, weak and gravitation. In the present paper a model is presented where each known force is the product of a particular interaction of one field which consists of longitudinal and transversal angular momenta of a Fundamental Particle (FP). It shows that electrons and positrons neither attract nor repel each other when the distance between them tends to zero. This allows to represent muons, tauons and hadrons as swarms of electrons and positrons called quarks. The paper then concentrates on relativity showing that it is a speed and not a time-space problem, and that time and space are absolute variables. It also shows that photons are emitted with light speed from their source and move with speeds different than light speed relative to a moving reference system.

1 Introduction.

The basic laws from the standard model, namely Coulomb, Ampere, Lorentz, Maxwell, Gravitation, etc., were simply introduced by adapting equations until they matched with the experimentally measured curves for the forces. They were not deduced mathematically from one fundamental interaction and require therefore the definition of special interactions for each external manifestation of the forces, namely electric, magnetic, strong, weak and gravitation.

The model "Emission & Regeneration", which allows the mathematical deduction of the well tested basic laws from one interaction, namely between the angular momenta of Fundamental Particles (FPs), divides Subatomic Particles (SPs) into two groups.

a) SPs with rest mass. This group includes electrons, positrons and particles composed of them.

b) SPs without rest mass. This group includes photons and neutrinos.

2 Representation of Subatomic Particles (SPs)

The model is based on the following physical representation of SPs.

1 SP are formed by rays of FPs that move from infinite to infinite with light speed (Fig. 1).

2 SPs with rest mass are formed by rays of FPs that are linked by a focal point where all rays cross.

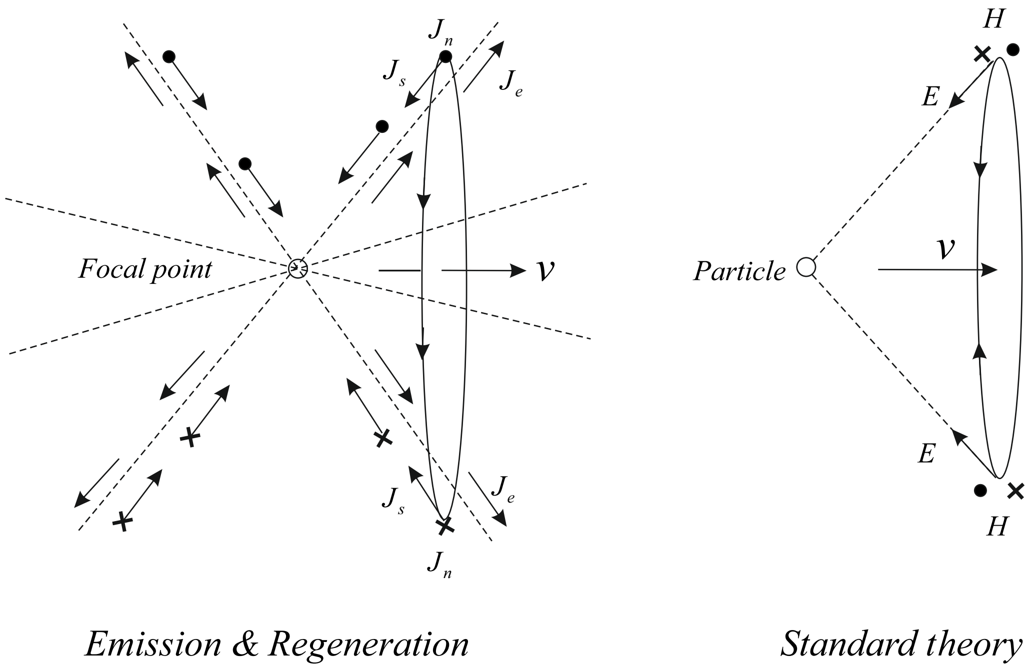

Figure 1: Particle as focal point in space

3 Each FP stores an infinitesimal part of the total energy of the SP. The energy is stored as rotation defining longitudinal J_s and transveral J_n angular momenta (field) at each FP .

4 To each FP with longitudinal and transversal angular moment of a SP corresponds an FP with opposed moment (Fig. 2). The sum of the angular momenta gives zero.

5 FPs of one ray have all their angular momenta oriented in the same direction. FPs with opposed angular momenta belong to different rays.

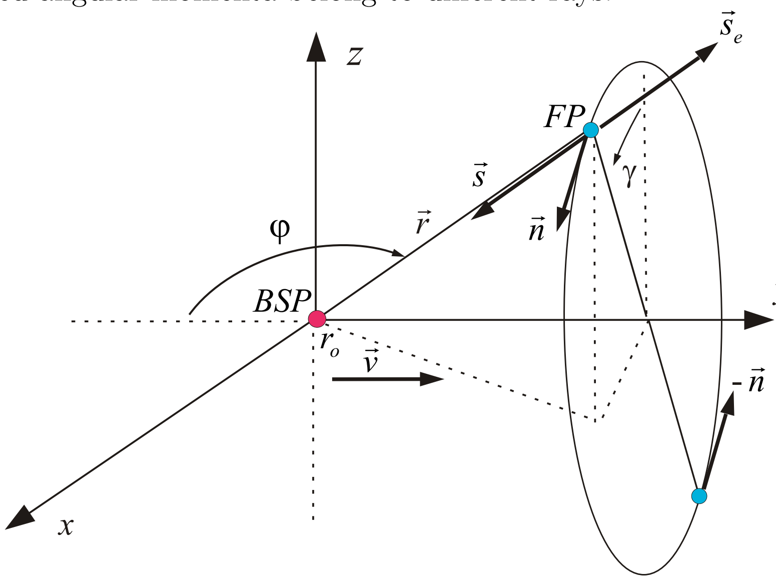

Figure 2: Unit vectors $\bar{s}$ and $\bar{n}$ for the angular momenta of a FP of a SP (BSP) moving with $v \neq c$

6 A SP at rest has only FPs with longitudinal angular momenta J_s. A SP moving with the speed $\bar{v}$ generates on its FPs additionaly transversal angular momenta J_n.

7 Photons are sequences of FPs with opposed angular momenta that have become independent from the rays of FPs that are linked to a focal point (Fig.3). The sequence of opposed FPs move along a ray with the sum of the angular momenta equal zero.

8 Neutrinos are pairs of FPs with opposed transversal angular momenta.

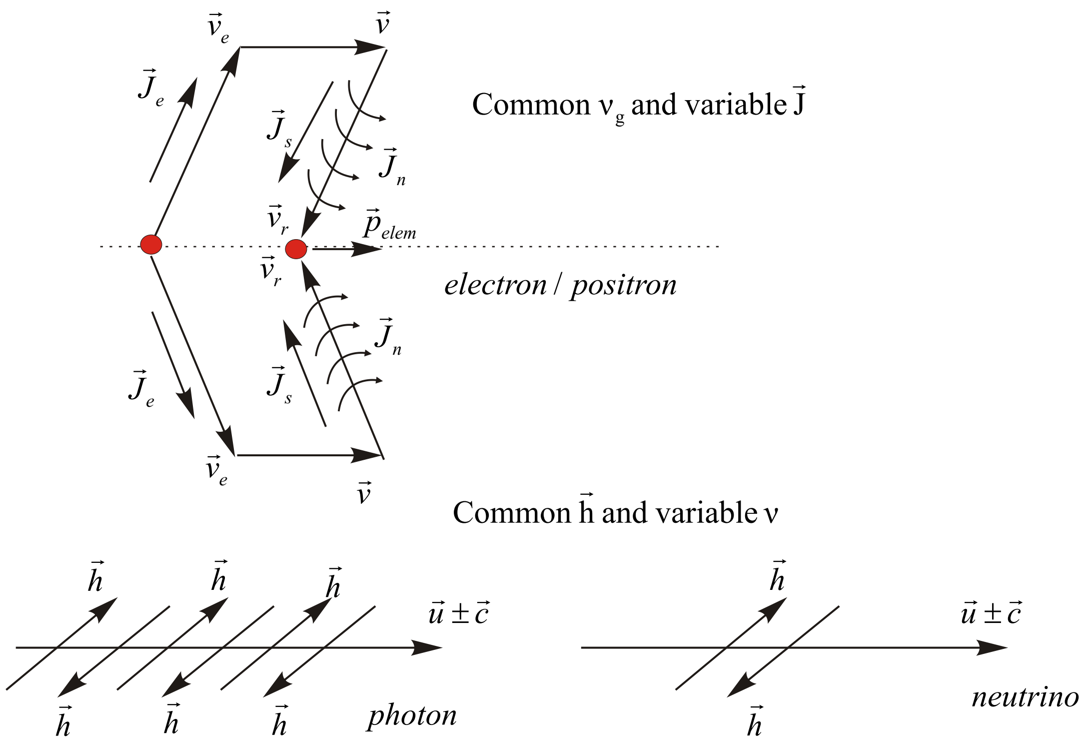

Figure 3: Electron, positron, photon and neutrino with the angular momenta J and h of their FPs.

3 Generation of linear momenta out of angular momenta.

The physical representation of SPs is based on energy stored in rotation defining corresponding angular momenta. The forces we measure are variations of linear momenta in time which are generated out of pairs of opposed angular momenta.

Fig. 4 shows how two FPs with opposed angular momenta $\bar{J}_n$ transform to a linear moment $d\bar{p}$ when they arrive on the focal point of a SP. The energy dE_n stored in the angular momenta $\bar{J}_n$ is transformed with the curl to the linear energy dE_p which allows the calculation of the linear moment dp.

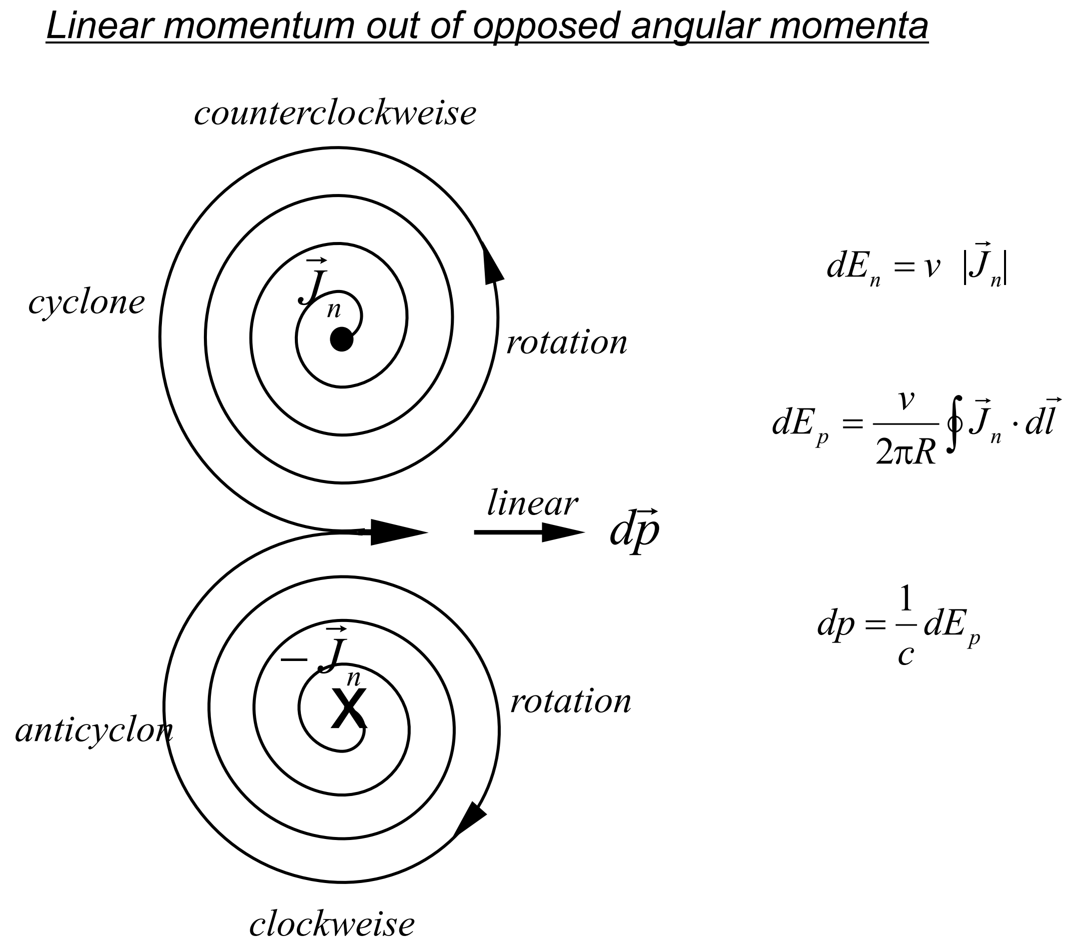

Figure 4: Generation of linear momentum out of opposed angular momenta

4 Generation of the known forces between SPs.

All four known forces between charged SPs with rest mass are the product of the interactions of the angular momenta of their FPs. The interactions are:

- between the longitudinal angular momenta of FPs of two static SPs (Coulomb law)
- between the transversal angular momenta of FPs of two moving SPs (Ampere law)
- between the longitudinal and the transversal angular momenta of a static and a moving SP (Induction law)

These three interactions are electromagnetic interactions. As the strong, the weak and the gravitation forces are combinations of the above interactions, they are also electromagnetic interactions. To show this it is necessary first to analyse the interaction between two charged static SPs as a function of the distance between them.

The concept is shown in Fig.5.

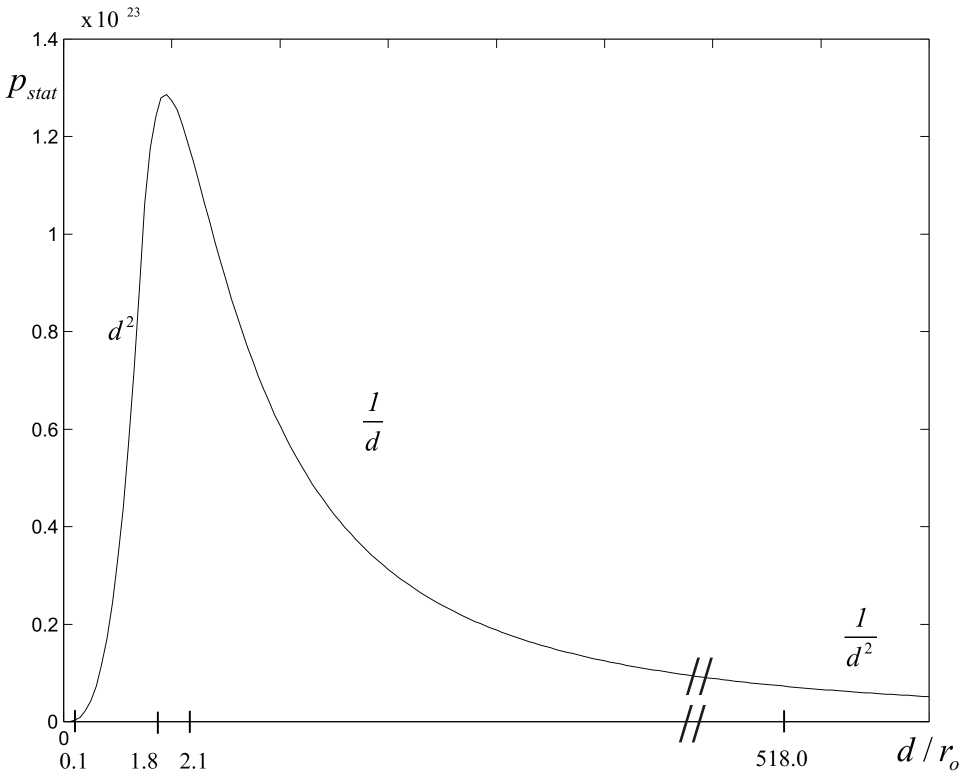

Figure 5: Linear momentum p_{stat} as function of $\gamma = d/r_o$ between two static BSPs with maximum at $\gamma = 2$. ($r_o = 1.0 \cdot 10^{-16}$)

The curve shows the momentum between two Basic Subatomic Particles (BSPs) which are the electron and the positron. It shows, that electrons and positrons neither attract nor repel each other when the distance between them tends to zero.

For the atom results a potential well as shown in Fig. 6

Five zones can be identified:

1 where electrons and positrons coexist without attracting or repelling each other and which constitutes the core of the nucleus.

2 the momentum barrier for electrons and positrons which migrate outside zone 1 and which are reintegrated to zone 1 or expulsed outside the atom when they interact with a remaining positron or electron from zone 1.

3 the maximum of the momentum barrier.

4 the decrease of the momentum inverse with the distance.

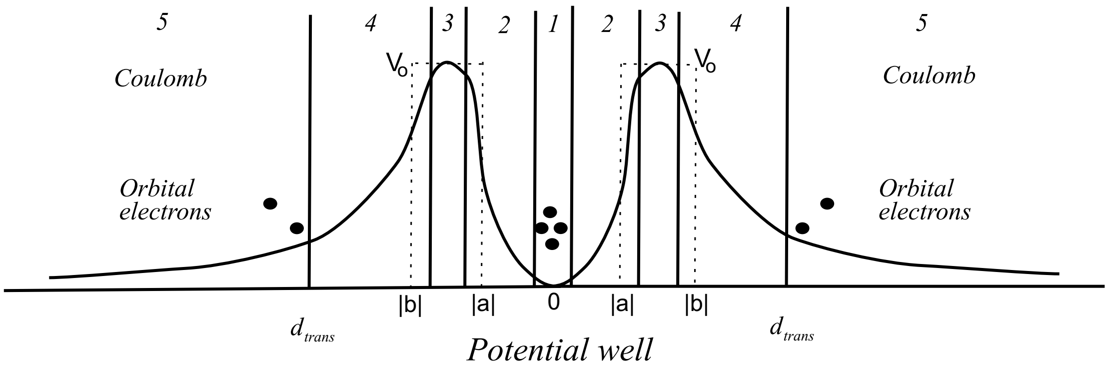

Figure 6: Potential well between BSPs

5 the decrease of the momentum inverse with the square distance (Coulomb).

The strong force was defined as the force necessary to hold the constituents of atomic nuclei together. As electrons and positrons neither attract nor repel for the distance between them tending to zero, quarks can be seen as composed of electrons and positrons and so the protons and neutrons. This means, that no force is necessary to hold the constituents of atomic nuclei together, in other words, the strong force is zero.

The gravitation force is generated when electrons or positrons that have migrated slowly from zone 1 (the core of the nucleus) to zone 2 are **reintegrated**, due to the interaction between the migrated BSPs (Fig.5) with electrons or positrons of the core. From the two so generated opposed linear momenta, one is passed per induction to an electron or positron of a second nucleus, resulting the attraction of the two nuclei. See also sec. 6.

The weak force is generated when migrated electrons or positrons are **expulsed** from zone 2 outside the atom due to the interaction with BSPs (Fig.5) of the core. The force is weak because the distance between the two interacting BSPs is small.

5 Quantum mechanics.

QM has two parts, namely QED and QCD. QED covers the electromagnetic interactions while QCD the strong and the weak interactions. Gravitation, which is described in the standard model by General Relativity, cannot be integrated into QM because it is a a geometric model and not a physical model.

The "E & R" model shows that electrons and positrons neither attract nor repel each other for the distance between them tending to zero. No strong force is required to hold the constituents of nuclei together. That allows to represent muons, tauons and hadrons as swarms of electrons and positrons called quarks.

The Dirac principle holds for all distances where the constituents of the particles attract or repel. It doesn't hold for the distances between the constituents of quarks, namely their electrons and positrons. In this case, the quark is to be considered as one basic particle like the electron or positron with the spin $\pm 1/2$. That explains the spins $1/2$ and $3/2$ for the baryons and the spins 0 for the mesons.

The "E & R" model shows that all forces are the product of electromagnetic interactions and covered by QED, consequently QCD is not necessary.

Examples of hadrons represented by swarms of electrons N^- and positrons N^+.

Proton

- For quark A that $N_A^+ = 416$ and $N_A^- = 83$
- For quark B that $N_B^+ = 95$ and $N_B^- = 19$
- For quark C that $N_C^+ = 408$ and $N_C^- = 816$

Neutron

- For quark A that $N_A^+ = 103$ and $N_A^- = 510$
- For quark B that $N_B^+ = 150$ and $N_B^- = 76$
- For quark C that $N_C^+ = 666$ and $N_C^- = 333$

π^+ **particle**

- For quark A that $N_A^+ = 77$ and $N_A^- = 15$
- For quark B that $N_B^+ = 60$ and $N_B^- = 121$

Note: The distribution of the number of electrons and positrons for the quarks at each hadron may differ.

6 The gravitation field.

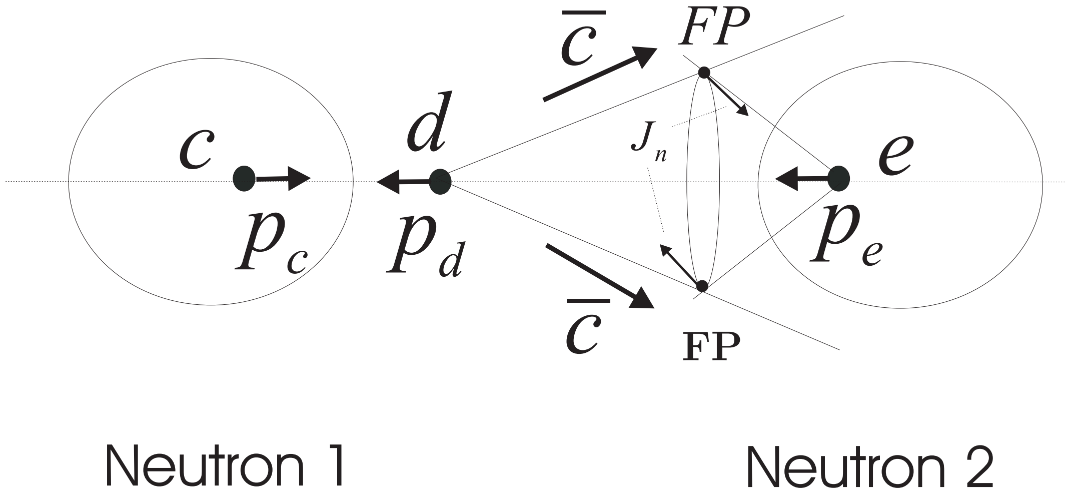

Figure 7: Momentum transmitted from neutron 1 to neutron 2

The gravitation field is an induction field and has its origin in the reintegration of migrated electrons/positrons to their atomic nuclei . When reintegrated, rays of FPs emitted with light speed carry opposed transversal angular momenta J_n, which are passed to electrons and positrons of an other atomic nuclei generating at them the gravitation force.

Fig. 7 shows two neutrons which are composed of electrons and positrons. At neutron 1 we have an electron/positron d which has migrated out of the neutron core and which is reintegrated to the core when its FPs interact with FPs of an electron/positron c. The moment p_d generated during the reintegration is passed per induction to an electron/positron of neutron 2, remaining finally the opposed momenta p_c and p_e which explains the attraction of the two neutrons. The gravitational moment p_d is passed through the FPs emitted with light speed "c" by the electron/positron d.

If Neutron 1 moves with the speed u relative to neutron 2 the gravitational moment is passed through FPs that move with the speed $c \pm u$.

6.1 The gravitation field of a binary pulsar.

Fig. 8 shows the masses M_1 and M_2 of the two bodies of a binary pulsar and their orbits around the center of gravity. From each mass rays of FPs are emitted with the light speed c in all directions as shown at Fig. 7 for neutron 1. Due to the tangential speed $\bar{u}$ of the mass the speed of the FPs at each ray is $\bar{c} \pm \bar{u}$. When two FPs emitted by the two masses cross in space, the opposed components of the tangential speed $\bar{u}$

cancel out and the FPs continue with the light speed $\bar{c}$ as shown for the two points in space. The result is a configuration of gravitational FPs equal to two static masses placed at the x coordinate for each position of the binary pulsar.

If we have a look at the rays of FPs that are parallel to the y coordinate in the $y \to -\infty$ direction, at the mass M_1 the sequence of the emitted FPs with the speed $\bar{c}+\bar{u}$ are reduced to the speed $\bar{c}$ and are compressed, while at the mass M_2 the sequence of the emitted FPs expanded to the speed c. All gravitational FPs emitted by the binary pulsar move with light speed $\bar{c}$ relative to the binary pulsar independent of the tangential speed $\bar{u}$ of the two masses.

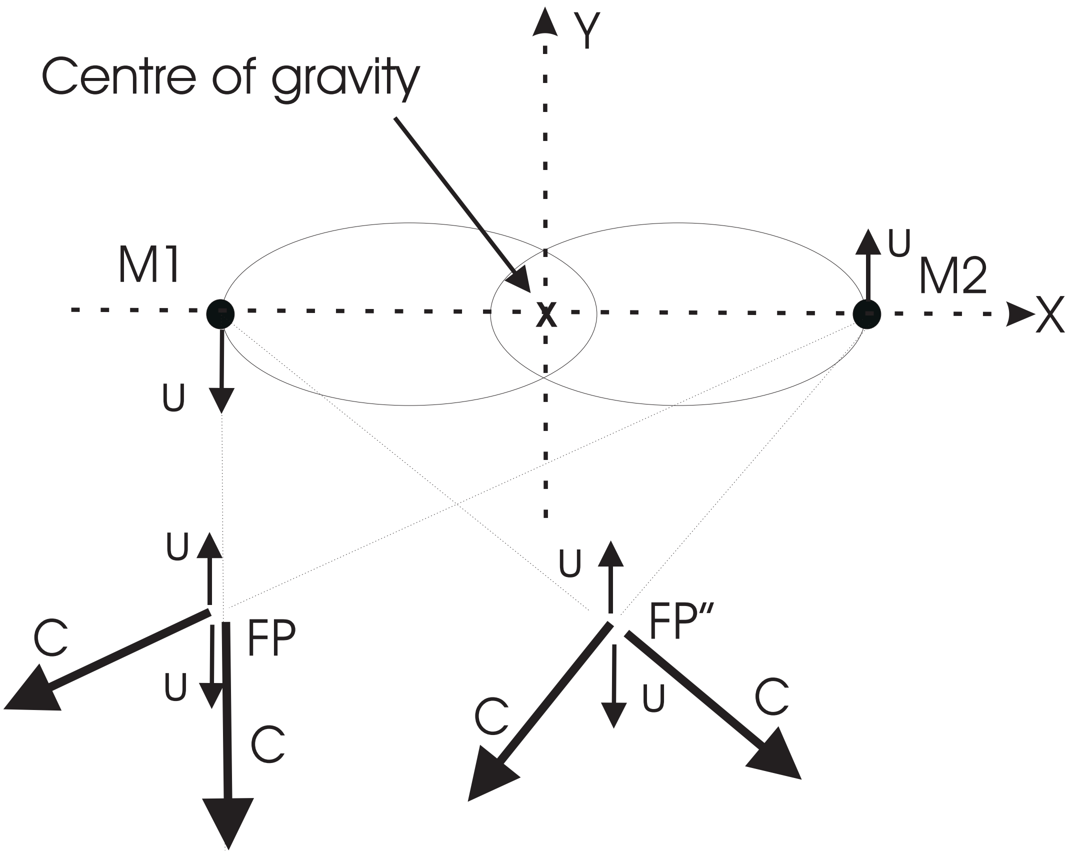

Figure 8: Speed of the gravitational Fundamental Particles
at binary pulsars.

6.2 Photons emitted by a binary pulsar.

The following analysis is to show why photons emitted with light speed from its source at a binary pulsar arrive to a receiver with light speed, independent of the relative movement between them and, without the need to postulate that light moves with c independent of its source.

Photons have their origin at the orbital electrons of atoms and are emitted with light speed relative to the atoms which are their source. A photon is an independent ray of FPs with alternate opposed transversal angular momenta.

Gravitational rays of FPs have their origin at the atomic nuclei and the FPs have transversal angular momenta that are all oriented in the same direction.

As both are sequences of FPs, the same mechanism as described for the gravitational field of the binary pulsar is valid for the gamma rays emitted by the magnetic field of the neutron. Photons are emitted with light speed $\bar{c}$ from their source at the mass M_1. They move then with $\bar{c}\pm\bar{u}$ relative to a coordinate system placed in the center of gravity of the binary pulsar, as shown in Fig. 8. They then interact with the gravitational FPs emitted by the mass M_2, which also move with $\bar{c} \pm \bar{u}$. During the interaction the opposed tangential speeds $\pm\bar{u}$ cancel out and the photon and the gravitational FPs continue with light speed $\bar{c}$. The modification of the speed on the photons produces a red or a blue Doppler effect.

All photons emitted by the binary pulsar move with light speed $\bar{c}$ relative to the binary pulsar independent of the tangential speed $\bar{u}$ of the source of the photons.

7 Relativity as a speed problem.

7.1 Introduction.

Special Relativity derived by Einstein is a mathematical approach with the unphysical results of time dilation, length contraction and the invariance of the light speed. This paper presents an approach where the Lorenz transformations are build exclusively on equations with speed variables instead of the mix of space and time variables and, where the interaction with the measuring instrument is taken into consideration. The results are transformation rules between inertial frames that are free of time dilation and length contraction. The equations derived for the momentum, energy and the Doppler effect are the same as those obtained with special relativity. The present work shows the importance of including the characteristics of the measuring equipment in the chain of physical interactions to avoid unphysical results.

Space and time are variables of our physical world that are intrinsically linked together. Laws that are mathematically described as independent of time, like the Coulomb and gravitation laws, are the result of repetitive actions of the *time variations* of linear momenta [10].

To calculate the transformation equations Einstein made abstraction of physical interactions imposing mathematically light speed equal in all inertial frames. The result of the abstraction are transformation rules that show time dilation and length contraction.

The physical interactions omitted by Einstein are given in the authors "Emission & Regeneration" UFT [10] and are:

- photons are emitted with light speed c relative to their source
- photons emitted with c in one frame that moves with the speed v relative to a second frame, arrive to the second frame with speed $c \pm v$.
- photons with speed $c \pm v$ are reflected with c relative to the reflecting surface
- photons refracted into a medium with $n = 1$ move with speed c independent of the speed they had in the first medium with $n \neq 1$.

The concept is shown in Fig. 9

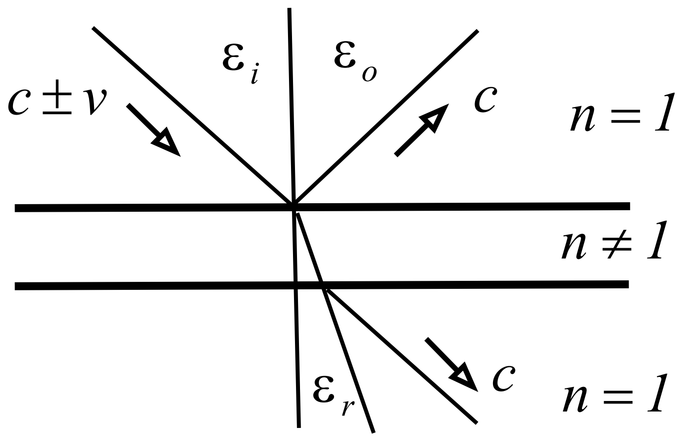

Figure 9: Light speed at reflections and refractions

The Lorenz transformation applied on speed variables, as shown in the proposed approach, is formulated with absolute time and space for all frames and takes into account the physical interactions at measuring instruments that produce the constancy of the measured light speed in all inertial frames.

7.2 Lorenz transformation based on speed variables.

The general Lorentz Transformation (LT) in orthogonal coordinates is described by the following equation and conditions for the coefficients [6]:

$$\sum_{i=1}^{4}(\theta^i)^2 = \sum_{i=1}^{4}(\bar{\theta}^i)^2 \qquad \sum_{i=1}^{4} \bar{a}^i_k \bar{a}^i_l = \delta_{kl} \qquad \sum_{i=1}^{4} \bar{a}^k_i \bar{a}^l_i = \delta^{kl} \tag{1}$$

with

$$\bar{\Theta}^i = \bar{a}^i_k \Theta^k \; + \; \bar{b}^i \tag{2}$$

The transformation represents a relative displacement $\bar{b}^i$ and a rotation of the frames and conserves the distances $\Delta\Theta$ between two points in the frames.

Before we introduce the LT based on speed variables we have a look at Einstein's formulation of the Lorentz equation with space-time variables as shown in Fig. 10.

$$x^2 + y^2 + z^2 + (ic_o\, t)^2 = \bar{x}^2 + \bar{y}^2 + \bar{z}^2 + (ic_o\, \bar{t})^2 \tag{3}$$

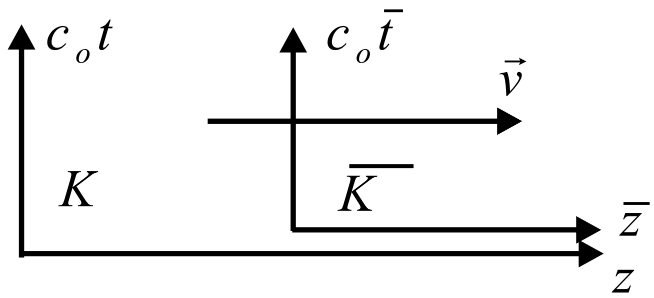

Figure 10: Transformation frames for **space-time** variables

For distances between two points eq. (3) writes now

$$(\Delta x)^2 + (\Delta y)^2 + (\Delta z)^2 + (ic_o\, \Delta t)^2 = (\Delta \bar{x})^2 + (\Delta \bar{y})^2 + (\Delta \bar{z})^2 + (ic_o\, \Delta \bar{t})^2 \tag{4}$$

The fact of equal light speed in all inertial frames is basically a speed problem and not a space-time problem. Therefor, in the proposed approach, the Lorentz equation is formulated with speed variables and absolut time and space. Dividing eq. (4) through the **absolute time** $(\Delta t)^2$ and introducing the forth speed v_c we have

$$v_x^2 + v_y^2 + v_z^2 + (iv_c)^2 = \bar{v}_x^2 + \bar{v}_y^2 + \bar{v}_z^2 + (i\bar{v}_c)^2 \tag{5}$$

The forth speed v_c introduced is the speed of Fundamental Particles (FPs) that move radially through a focus in space, according to a new representation of basic subatomic particles like the electron or positron shown in Fig. 1.

The FPs store the energy of the subatomic particles as rotations defining longitudinal and transversal angular momenta. The speed v_c is independent of the speeds v_x, v_y and v_z, forming together a four dimensional speed frame.

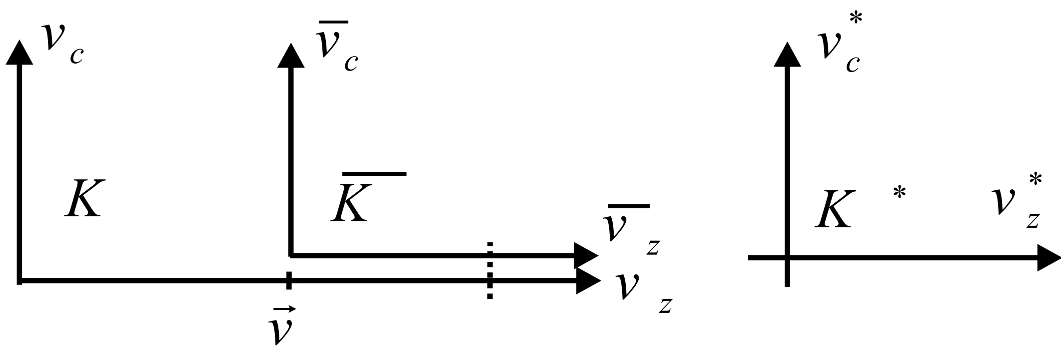

Figure 11: Transformation frames for **speed** variables

For the Lorentz transformation with speed variables Fig. 11 we get the following transformation rules between the source frame K and the virtual frame $\bar{K}$:

a) $\bar{v}_x = v_x$ $\qquad v_x = \bar{v}_x$

b) $\bar{v}_y = v_y$ $\qquad v_y = \bar{v}_y$

c) $\bar{v}_z = (v_z - v)\,\gamma_v$ $\qquad v_z = (\bar{v}_z + v)\,\gamma_v$

d) $\bar{v}_c = (v_c - \frac{v}{v_c}\,v_z)\,\gamma_v$ $\qquad v_c = (\bar{v}_c + \frac{v}{\bar{v}_c}\,\bar{v}_z)\,\gamma_v$

with $\quad \gamma_v = [1 - v^2/v_c^2]^{-1/2}$

7.3 Transformations for momentum and energy of a particle.

For $v_z = 0$ and $v_c = c$, where c is the light speed, we get

a) $\bar{v}_x = v_x$ $\qquad$ b) $\bar{v}_y = v_y$

c) $\bar{v}_z = -v\,\gamma_v$ $\qquad$ d) $\bar{v}_c = c\,\gamma_v$

We see that for $v_z = 0$ the transformed speeds $\bar{v}_z$ and $\bar{v}_c$ are not linear functions of the relative speed v because

$$\gamma_v = \left(1 - \frac{v^2}{v_c^2}\right)^{-1/2} = 1 + \frac{1}{2}\,\frac{v^2}{v_c^2} + \frac{1\cdot 3}{2\cdot 4}\,\left(\frac{v^2}{v_c^2}\right)^2 + \frac{1\cdot 3\cdot 5}{2\cdot 4\cdot 6}\,\left(\frac{v^2}{v_c^2}\right)^3 + \cdots \tag{6}$$

The case $v_z = 0$ is the case of a particle placed at the origin of the frame K. The momentum and the energy of the particle in the frame $\bar{K}$ are given by

$$\bar{p} = m\,\bar{v}_z = -m\,v\gamma_v \qquad \bar{E} = mc\,\bar{v}_c = mc\,c\gamma_v = \sqrt{E_o^2 + E_p^2} \tag{7}$$

$$E_o = mc^2 \qquad and \qquad E_p = mc\bar{v}_z = mc\,v\gamma_v \tag{8}$$

As the speed v_z in the frame K is parallel to the relative speed v between the frames, the momentum and the energy of a particle moving with v in the frame K and a relative speed v_z between the frames must give the same values. This we obtain multiplying the transformed speeds $\bar{v}_i$ with γ_{v_z}

$$\gamma_{v_z} = \left[1 - v_z^2/v_c^2\right]^{-1/2} \tag{9}$$

We get for the general case with $v_z \neq 0$ the momentum and the energy in the frame $\bar{K}$

$$\bar{p} = m\,\bar{v}_z\gamma_{v_z} = m\,(v_z - v)\gamma_v\gamma_{v_z} \qquad \bar{E} = mc\,\bar{v}_c\gamma_{v_z} = mc\,(v_c - \frac{v}{v_c}v_z)\gamma_v\gamma_{v_z} \tag{10}$$

Note: The frame $\bar{K}$ is a *virtual* frame because the speeds calculated with the Lorentz transformation equations for this frame are virtual speeds and not the real Galilean speeds of the particles, which are $\bar{v}_{r_z} = v_z \pm v$. The frame $\bar{K}$ gives the virtual velocities that allow the calculation of the values of the momentum and energy, which are not linear functions of the real Galilean speed $\bar{v}_{r_z}$.

For the distances between the frames K and $\bar{K}$ the Galilean relativity is valid.

$$\Delta\bar{z} = z_o \pm v\,\Delta t \qquad with \qquad \Delta\bar{t} = \Delta t \quad for\ all\ speeds \quad v \tag{11}$$

If we start counting time when the origin of all frames coincide so that it is

$$z = \bar{z} = z^* = 0 \qquad for \qquad t = 0 \tag{12}$$

we get for the different types of measurements

Measurement	**K**	$\bar{\mathbf{K}}$	$\overset{*}{\mathbf{K}}$
ideal	$z = z_o$	$\bar{z} = z_o \pm v\,t$	$z^* = z_o \pm v\,t$
non destructive	$z = z_o$	$\bar{z} = z_o \pm v\,t$	$z^* \approx z_o \pm v\,t$
destructive	$z = z_o$	$\bar{z} = z_o \pm v\,t$	$z^* = z_o \pm v\,t_{meas}$

where t_{meas} is the time the destructive measurement took place at the instrument placed in K^*.

As time and space are absolute variables it is

$$\Delta t = \Delta \bar{t} = \Delta t^* \qquad\qquad \Delta z = \Delta \bar{z} = \Delta z^* \tag{13}$$

Note: The Lorentz transformation equations a),b) and c) are independent equations with the variables v_x, v_y and v_z; there is no cross-talking between them. Not so equation d) where $\bar{v}_c$ is a function of v_c and v_z. The speed v_z is modifying $\bar{v}_c$.

7.4 Transformations for electromagnetic waves at measuring instruments .

According to the approach "Emission & Regeneration" Unified Field Theory [10] from the author, measuring instruments are composed of an interface and the signal comparing part. Interfaces are optical lenses, mirrors or electric antennas.

The concept is shown in Fig.12

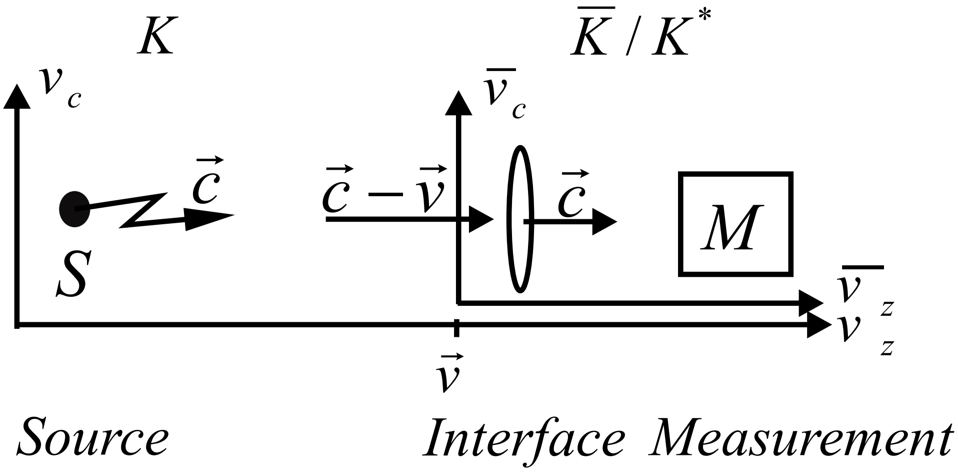

Figure 12: Transformation at measuring equipment's interface

Electromagnetic waves that are emitted with the speed c_o from its source, arrive to a relative moving frame of the measuring instrument with speeds different than light speed, are first absorbed by the atoms of the interface and than emitted with light speed c_o to the signal comparing part .

To take account of the behaviour of light in measuring instruments an additional transformation is necessary.

In Fig 12 the instruments are placed in the frame K^* which is linked rigidly to the *virtual* frame $\bar{K}$. Electromagnetic waves from the source frame K move with the real speed $\bar{v}_{r_z} = c_o \pm v$ in the *virtual* frame $\bar{K}$. The real velocity $\bar{v}_{r_z}$ can take values that are bigger than the light speed c_o.

The links between the frames for an electromagnetic wave that moves with c_o in the frame K are:

	$\mathbf{K}$	$\bar{\mathbf{K}}$	$\overset{*}{\mathbf{K}}$
e)	λ_z	$\bar{\lambda} = \lambda_z$	
f)	$v_z = c_o$	$\bar{v}_{r_z} = c_o \pm v$	$v_z^* = c_o$
g)	$f_z = c_o/\lambda_z$	$\bar{f}_{r_z} = \bar{v}_{r_z}/\lambda_z$	
h)		$\bar{f}_z = \bar{f}_{r_z}\,\gamma$	$f_z^* = \bar{f}_z$
i)	$E = h\,f_z$	$\bar{E} = h\,\bar{f}_z$	$E_z^* = h\,f_z^*$

e) shows the link between the frames K and $\bar{K}$. The wavelengths $\lambda_z = \bar{\lambda}_z$ because there is **no length contraction**.
f) shows the real Galilean speed $\bar{v}_{r_z}$ in frame $\bar{K}$.
g) shows the real frequency $\bar{f}_{r_z}$ in the frame $\bar{K}$.
h) shows the virtual frequency $\bar{f}_z$ in the frame $\bar{K}$ and the link to the frequency f^* of the frame K^*.
i) shows the equation for the energy of a photon for each frame.

Note: Also for electromagnetic waves the frame $\bar{K}$ gives the virtual velocity that allows the calculation of the values of the momentum, energy and frequency, which are not linear functions of the real speed $\bar{v}_{r_z}$.

For electromagnetic waves we have the following real speeds for the different types of measurements:

Measurement	$\mathbf{K}$	$\bar{\mathbf{K}}$	$\overset{*}{\mathbf{K}}$	**Refraction**
ideal	$v_z = c_o$	$\bar{v}_{r_z} = c_o \pm v$	$v_z^* = c_o$	$n = 1$
non destructive	$v_z = c_o$	$\bar{v}_{r_z} = c_o \pm v$	$v_z^* < c_o$	$n > 1$
destructive	$v_z = c_o$	$\bar{v}_{r_z} = c_o \pm v$	$v_z^* = 0$	$n \Rightarrow \infty$

with n the optical refraction index $n = c_o/v_z^*$.

7.5 Equations for particles with rest mass $m \neq 0$.

Following, equations for physical magnitudes are derived for particles with rest mass $m \neq 0$ that are measured in an inertial frame that moves with constant speed v. For this case the transformation equations a), b), c) and d) from K to $\bar{K}$ are used. The transfomation from $\bar{K}$ to K^* is the **unit** transformation, because of conservations of momentum and energy between rigid linked frames.

7.5.1 Linear momentum.

To calculate the linear momentum in the virtual frame $\bar{K}$ of a particle moving in the source frame K with v_z and $v_x = v_y = 0$ we use the equation $c)$ of sec 7.2, with $v_c = c_o$. The speed $v_c = c_o$ describes the speed of the Fundamental Particles (FP) [10] emitted continuously by electrons and positrons and which continuously regenerate them, also when they are in rest in the frame K ($v_x = v_y = v_z = 0$). From (10) we define

$$\bar{v}_z^{'} = (v_z - v)\gamma_{v_z}\gamma_v \tag{14}$$

The linear momentum $\bar{p}_z$ we get multiplying $\bar{v}_z^{'}$ with the rest mass m of the particle.

$$\bar{p}_z = m\,\bar{v}_z^{'} = m\,(v_z - v)\gamma_{v_z}\gamma_v = p_z^* \tag{15}$$

Because of momentum conservation the momentum we measure in K^* is equal to the momentum calculated for $\bar{K}$, expressed mathematically $p_z^* = \bar{p}_z$.

Eq. (15) is the same equation as derived with special relativity.

Note: The rest mass is simply a proportionality factor which is not a function of the speed and is invariant for all frames.

7.5.2 Acceleration.

To calculate the acceleration in the virtual frame $\bar{K}$ we start with

$$\bar{a}_z = \frac{d\bar{v}_z^{'}}{dt} \qquad with \qquad \bar{v}_z^{'} = \bar{v}_z\,\gamma_{v_z} = (v_z - v)\gamma_v\gamma_{v_z} \tag{16}$$

what gives for $v_z(t)$ and $\gamma_{v_z}(t)$

$$\bar{a}_z = \frac{d\bar{v}_z^{'}}{dt} = \frac{d\bar{v}_z}{dt}\gamma_{v_z} + \bar{v}_z\frac{d\gamma_{v_z}}{dt} = \frac{dv_z}{dt}\,\gamma_{v_z}\gamma_v + (v_z - v)\gamma_v\,\frac{d}{dt}\gamma_{v_z} \tag{17}$$

From momentum conservation $p_z^* = \bar{p}_z$ we have that

$$\bar{a}_z = a_z^* \tag{18}$$

7.5.3 Energy.

To calculate the energy in the virtual frame $\bar{K}$ for a particle that moves with v_z in the frame K we use the equation $d)$ of sec 7.2, with $v_c = c_o$. The equation $d)$ is used because it gives the speeds of the FPs where the energy of the subatomic particles is stored.

$$\bar{v}_c = \frac{v_c - \dfrac{v}{v_c}\, v_z}{\sqrt{1 - v^2/v_c^2}} = (v_c - \frac{v}{v_c}\, v_z)\gamma = \bar{v}_{r_c}\, \gamma \tag{19}$$

To get the energy in the frame $\bar{K}$ we multiply $\bar{v}_c$ with $mc\gamma_{v_z}$. See also eq. (10). We get

$$\bar{E} = mc\, \bar{v}_c \gamma_{v_z} = mc\, (v_c - \frac{v}{v_c} v_z)\gamma_v \gamma_{v_z} \tag{20}$$

Eq. (20) is the same equation as derived with special relativity.

With $v_z = 0$ we get

$$\bar{E} = \frac{m\, c_o^2}{\sqrt{1 - v^2/c_o^2}} = \sqrt{E_o^2\ +\ \bar{E}_p^2} \tag{21}$$

with

$$\bar{E}_p = m\, |\bar{v}_z|\, c_o = |\bar{p}_z|\, c_o \qquad \bar{v}_z = v_z\, \gamma_{v_z} \qquad E_o = m\, c_o^2 \tag{22}$$

To calculate the energy $\bar{E}_p = m\ \bar{v}_z\ c_o$ we must calculate $\bar{v}_z$ as explained in sec. 7.5.1 with $v_z = 0$.

The energy E_o is part of the energy in the frame $\bar{K}$ and invariant, because if we make $v = 0$ we get E_o as the rest energy of the particle in the frame K.

Because of energy conservation between frames without speed difference the energy E^* in the frame K^* is equal to the energy $\bar{E}$ in the frame $\bar{K}$.

7.6 Equations for particles with rest mass $m = 0$.

In this section the equations for electromagnetic waves observed from an inertial frame that moves with the relative speed v are derived. A comparison between the proposed approach and the Standard Model is made.

7.6.1 Relativistic Doppler effect.

The speed $v_c = c_o$ describes the speed of the Fundamental Particles (FP) [10] emitted continuously by electrons and positrons and which continuously regenerate them, also when they are in rest in frame K ($v_x = v_y = v_z = 0$). In the case of the photon no emission and regeneration exist.

The photon can be seen as a particle formed by only two parallel rays of FPs. The first ray carries FPs with opposed transversal angular momenta of equal orientation and the second ray carries FPs with transversal angular momenta opposed to the first ray. At each ray FPs exist only along the length L of the photon.

The concept is shown in Fig. 13

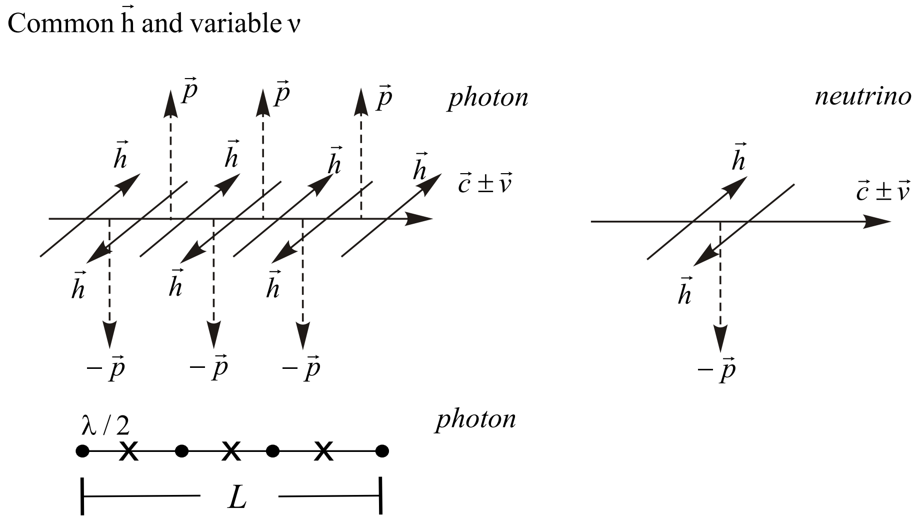

Figure 13: Photon and neutrino

To calculate the energy of a photon in the virtual frame $\bar{K}$ that moves with $v_z = c_o$ in the frame K we use the same equation $d)$ of sec 7.2 used for particles with $m \neq 0$, with $v_z = c_o$ and $v_c = c_o$. We use equation $d)$ because the energy is stored in FPs. We get

$$\bar{v}_c = \frac{v_c - \dfrac{v}{v_c}\, v_z}{\sqrt{1 - v^2/v_c^2}} = (c_o - v)\gamma_v \tag{23}$$

Note: As the energy of a photon is a function of the frequency, the energy in the frame $\bar{K}$ is not afected by the non linear factor γ_z.

The momentum of a photon in the frame K is $p_c = E_{ph}/c_o = h\ f/c_o$ which we multiply with $\bar{v}_c$ to get the energy of the photon in the frame $\bar{K}$. The transformation of the energy between the frames $\bar{K}$ and K^* is $E^* = \bar{E}$ and we get:

For the measuring instrument moving away from the source

$$\bar{E} = p_c\, \bar{v}_c = \frac{E_{ph}}{c_o}\, (c_o - v)\, \gamma_v = E_{ph}\, \frac{\sqrt{c_o - v}}{\sqrt{c_o + v}} = E^* = h\ f^* \tag{24}$$

With $E_{ph} = h\ f$ we get the well known equation for the relativistic Doppler effect

$$f^* = f\ \frac{\sqrt{c_o - v}}{\sqrt{c_o + v}} \qquad or \qquad \frac{f}{f^*} = \frac{\sqrt{1 + v/c_o}}{\sqrt{1 - v/c_o}} \tag{25}$$

and with $c_o = \lambda\ f$ and $c_o = \lambda^*\ f^*$ we get the other well known equation for the relativistic Doppler effect

$$\frac{\lambda}{\lambda^*} = \frac{\sqrt{1 - v/c_o}}{\sqrt{1 + v/c_o}} \tag{26}$$

Eq. (25) is the same equation as derived with special relativity.

Note: No transversal relativistic Doppler effect exists.

Note: The real frequency $\bar{f}_{r_z}$ in the frame $\bar{K}$ is given by the Galilean speed $\bar{v}_{r_z} = c_o \pm v$ divided by the wavelength $\bar{\lambda} = \lambda$. The energy of a photon in the frame $\bar{K}$ is given by the equation $\bar{E}_{ph} = h\ \bar{f}_z$ where $\bar{f}_z = \bar{f}_{r_z}\ \gamma$, with $\bar{f}_{r_z} = (c_o \pm v)/\lambda_z$ the real frequency of particles in the frame $\bar{K}$.

Note: All information about events in frame K are passed to the frames $\bar{K}$ and K^* exclusively through the electromagnetic fields E and B that come from frame K. Therefore all transformations between the frames must be described as transformations of these fields, what is achieved through the invariance of the Maxwell wave equations.

7.6.2 Transformation steps for photons from emitter to receiver.

Electromagnetic signals (photons) have to pass an interface at the receiver until a measurement can be made. The interface is an optical lense, a mirror or an antenna. The signals undergo two transformations when travelling from the emitter to the receiver. The first transformation occurs before the interface and the second behind the interface.

The concept is shown in Fig.14

If we assume that the emitters signal in the K frame is

$$c = \lambda\ f \tag{27}$$

the signal befor the interface of the receiver in the $\bar{K}$ frame is;
for the measuring instrument moving away from the source

$$\bar{f} = f\ \frac{\sqrt{c - v}}{\sqrt{c + v}} \qquad and \qquad \bar{\lambda} = \lambda \qquad and \qquad \bar{v}_z = c - v \tag{28}$$

At the output of the interface we get the signal in the K^* frame that is finally

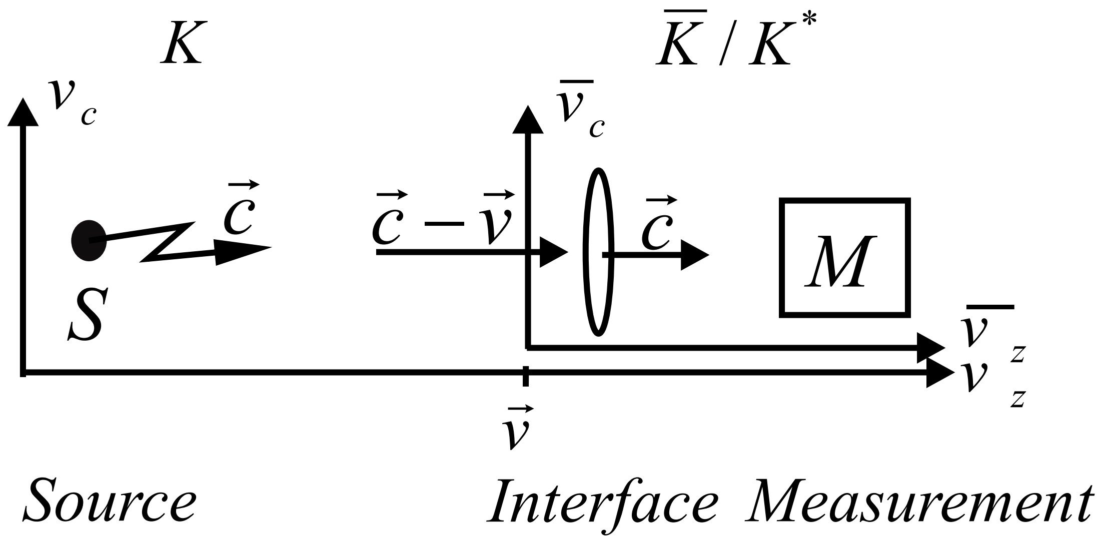

Figure 14: Transformation at measuring equipment's interface

processed by the receiver.

$$f^* = f \, \frac{\sqrt{c-v}}{\sqrt{c+v}} \qquad and \qquad \lambda^* = \lambda \, \frac{\sqrt{c+v}}{\sqrt{c-v}} \qquad and \qquad v_z^* = c \tag{29}$$

At the first transformation the wavelength $\lambda = \bar{\lambda}$ doesn't transform (absolute space) and at the second transformation the frequency $\bar{f} = f^*$ (absolute time).

The speed before the interface $c \pm v$ is the galilean speed which changes to $v_z^* = c$, the speed of light, before the processing in the receiver. This explains why always c is measured in all relative moving frames.

8 Characteristics of the two approaches for Relativity.

8.1 Time and length.

SR from our Standard Model (SM) explains the constancy of the light speed in all inertial frames with time dilation and length contraction making abstraction of what really happens with light when it moves between inertial frames. The result is, that scientists justify experimental data with time dilation and length contraction and don't realize that these are only helpmates that stand for interactions between the light and the measuring instruments.

8.2 Units, time and clocks.

To make physical interactions comparable, units (meter, kilogram, second, ampere, kelvin, mole and candela) must be equal in all frames.

Time dilation and length contraction is equivalent to say that time unit (second) contract and length unit (meter) dilate, in other words, that units are not equal in all frames violating fundamental principles of theoretical and experimental physics.

Theories that are flawed present contradictions and paradoxes what is the case of Special Relativity.

Time can only be defined relative to one physical clock in the universe to which all other physical clocks must be synchronized. .

Clocks build by man are physical devises whose stability of oscillations are influenced by many factors like, temperature, pressure, humidity, electromagnetic fields, vibrations, gravitation, relative speed to other masses, probability, etc. That makes it difficult to compare times recorded with different clocks.

8.3 Paradoxes and incompatibilities.

The most evident sign that a theory is flawed are paradoxes (contradictions). The list of paradoxes due to SR of our SM is considerable. All paradoxes are build on time dilation and space contraction.

In the frame of our Standard Model (SM) the results of the Sagnac experiment are not compatible with Special Relativity and easily explained with non relativistic equations, but still assuming that light moves with light speed independent of its source. The Sagnac experiment analyzed in the frame of the "E & R" UFT shows no incompatibilities with the proposed approach.

- All four known forces are the product of the interactions of FPs.
- The gravitation force has its origin in the reintegration of migrated electrons and positrons to their nuclei.
- Relativity is a speed problem with absolute time and space.
- Photons are sequences of FPs with opposed transversal angular momenta.

9 Resume.

The basic laws from the standard model, namely Coulomb, Ampere, Lorentz, Maxwell, Gravitation, etc., were simply introduced by adapting equations until they matched with the experimentally measured curves for the forces. They were not deduced mathematically from one fundamental interaction and require therefore the definition of special interactions for each external manifestation of the forces, namely electric, magnetic, strong, weak and gravitation. The paper presents a model where each known force is the product of a particular interaction of one field which consists of longitudinal and transversal angular momenta of a Fundamental Particle (FP). It also shows that electrons and positrons neither attract nor repel each other when the distance between them tends to zero. This allows to represent muons, tauons and hadrons as swarms of electrons and positrons called quarks.

Einstein's approach to Special Relativity is an heuristic (pragmatic) approach ignoring the interactions light suffers when moving between inertial frames resulting in equal light speed in all frames. The proposed approach postulates that light is emitted with light speed relative to the emitting source and that light is absorbed by optical lenses and electric antennas of the measuring instruments and subsequently emitted relative to them with light speed, explaining why always light speed is measured in all inertial frames. Relativity is treated exclusively as a speed problem with absolute time and space. The same equations as for special relativity are obtained, but with a model free of unphysical concepts like time dilation, length contraction and that light moves with c independent of its source.

All experiments where time dilation or length contraction are apparently measured are indirect measurements based on concepts and conclusions of the model (special relativity) which is experimentally to be confirmed. As the model was made consistent, in other words free of internal contradictions, the indirect measurements obviously confirm time dilation and length contraction. The flaw consists in that one is moving in a closed loop.

Bibliography

Note: The present approach is based on the concept that fundamental particles are constantly emitted by electrons and positrons and constantly regenerate them. As the concept is not found in mainstream theory, no existing paper can be used as reference.

1. Günter Lehner. **Elektromagnetische Feldtheorie.** 7. bearbeitete Auflage 2010. Springer Verlag.

2. Hering · Martin · Stohrer. **Physik für Ingenieure.** Vierte, verbesserte Auflage 1992. VDI Verlag.

3. Albrecht Lindner. **Grundkurs Theoretische Physik.** Teubner Verlag, Stuttgart 1994.

4. Georg Joos. **Lehrbuch der Theoretischen Physik.** 15., völlig neu bearbeitete Auflage 1989. AULA-Verlag Wiesbaden.

5. Max Schubert / Gerhard Weber. **Quantentheorie, Grundlagen und Anwendungen.** Spektrum, Akad. Verlag 1993.

6. Harald Klingbeil. **Electromagnetische Feldtheorie.** 2. überarbeitete Auflage 2011, Vieweg + Teubner Verlag.

7. Benenson · Harris · Stocker · Lutz. **Handbook of Physics.** Springer Verlag 2001.

8. B.R. Martin & G. Shaw. **Particle Physics.** John Wiley & Sons 2003.

9. Stephen G. Lipson. **Optik.** Springer Verlag 1997.

10. Osvaldo Domann. **"Emission & Regeneration" Unified Field Theory.** June 2003. www.odomann.com.