2. The fundament of forces

2.1 The creation of energons

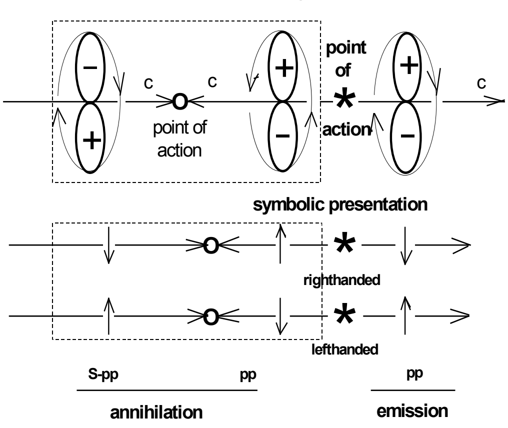
Accepting the theses, proposed in the introduction, one has to see the creation of energons (*pp*'s) as the division of neutral emptiness into positive and negative entities, taking place under the extreme conditions of *pp*-density in the *ec*-mantle. Unfortunately, this concept does not solve the old 'hen or egg' problem, but it can explain indeed the existence of fields of forces around matter. It can also offer a deeper insight into the essence of Einstein's space as being filled up with moving energetic particles, and consequently enlarging the significance of the properties that he imputed to space, for instance the curvation by the presence of masses.

In terms of conventional mechanics *pp*-creation can be expressed by the equation:

$$\mathbf{0 \Leftrightarrow 2(m_0 - m_0).a}$$

in which m_o and $-m_o$ stand for two inert 'masses' (poles) with opposite properties (mass and anti-mass), trying to annihilate but staying separately by fast orbiting, expressed by *a* (acceleration).

Figure 1



However, only the simultaneous creation of a recoiling second *pp*, expressed by the digit 2 in the equation, can effectuate the revolving motion. It may be clear that there must be two kinds of spinning movement of the two *pp*'s: right- or left-handed with respect to the linear motion. Only one kind of *pp*-rotation occurs in one kind of *ec* .

Figure 1 shows the *pp*-creation and annihilation schematically**.** The formula of creation implicates the existence of a force between the two poles. It includes also the possibility of two opposite potential forces $m_o.a$ and $-m_o.a$ with respect to a second *pp (Spp),* coming to expression in a positive or negative sense when a *pp* hits an *ec*. The reaction with *Spp*'s with an opposite rotation (equally sensed) creates a positive force. The reaction with equally rotating *Spp*'s (opposite sense) results in a negative force (attracting).

2.2 The exertion of force by energons

Seen on its own a separate *pp* cannot possess any energy because it contains a mass as well as an anti-mass. The attractive force between the two poles cannot do any work because this vector is perpendicular to the direction of motion. That is different for the reaction of *pp*'s on the *Spp*'s in the *ec* -mantle. Here the attractive or recoiling forces between the poles of reacting *pp*'s are acting along lines that have components into the direction of movement. The basic theses state that the *pp*-annihilation liberates a distinct amount of energy ($\pm e_o$), in a distinct period of time (t_o). During this process the acting *pp* transfers its angular momentum as an energy to the receiving *ec* (see § 9.9 and pages 151-152), that can be found by division this momentum with $t_0 = r_{pp}/c$:

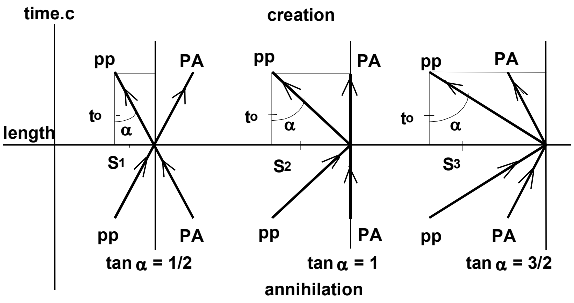
$$(\tfrac{1}{4}.m_{pp}.c.r_{pp})\ /\ t_o = \tfrac{1}{4}.m_{pp}.c.\ r_{pp}.c/r_{pp} = \tfrac{1}{4}.m_{pp}.c^2 = e_0.$$

Consequently, the repelling- or attracting forces cover distances of different length, depending on the velocity of the P_A' s, so that these forces also have to be different:

$$\text{force} = (\text{energy})/(\text{covered distance}),\quad \text{or } \pm f_x = (\pm e_o)/(t_o.c_x).$$

It is possible to depict the events of creation and annihilation in a time-length diagram (see **fig.2**). The figure shows the difference between the covered distances at different *pp*-velocities with res-pect to the *ec*-mantle The reaction period is plotted along the ordinate as a length (*t.c*) and the covered distances are plotted along the abscissa: S_1, S_2 and S_3 at velocity *½c*, *c* and *1½c* respectively. The *pp*-velocity c_x is expressed as tan α. The relative velocity between *pp*'s and P_A' s is -1 at annihilation and +1 at creation. The bottom half of the figure depicts annihilation and the top-half creation of *pp*'s.

Figure 2



Though fast *pp*'s exert minor forces, their number compensates that, as can be derived from the basic theses. The P_A' s in the *ec*-mantle form continuously levels of velocity between *-½c* and *+½c*, containing equal numbers of *Spp*’s having an equal chance to serve as points of creation (derived from theses 4 and 5). This means that levels with faster positive velocities produce more *pp*'s with respect to a fixed point of observation outside the *ec*. Suppose that the average level of $\boldsymbol{P_A}$-velocity emits *n* *pp*'s with velocity *c* to the area of observation *O* in the period of time t_x. The *pp*-density of the received beam measures in that case:

$D = n/(t_x.c.O)$

Though the *pp*-density of a beam coming from motion level V_x is equal to that coming from the mean level, it is passing the area of observation with different velocity. The amount of *pp*'s that passes during the period t_x is:

$n_x = n.c_x/c.$

Thus the amount of *pp*'s with equal velocity, coming from an *ec* and passing through a given area, is proportional to that velocity. The potential force exertion of these n_x *pp*'s measures:

$\pm n_x.f_x = \pm(c_x/c).n.e_o/(t_o.c_x), = \pm n.e_o/(t_o.c) =$ constant.

For reason of symmetry, the interaction between equally charged *ec*'s has to be the inverse of that between counter charged *ec*'s, which expresses that a *pp* has a dual character. At the collision between a *pp* and a *Spp* with an equal disposition (the same sense of rotation) the recoiling action between the equal poles prevails. The attracting action between the opposite poles prevails at the collision between a *pp* and a *Spp* with an opposite sense of rotation. The direction of force exertion is perpendicular to the planes of rotation of *pp* and *Spp*.

It must be clear that forces, generated by creation in the *ec*-mantle, compensate each other instantaneously into opposite directions. However, that is not the case with acting *pp*'s coming from another *ec*. Now a force along the connecting line will be the result.

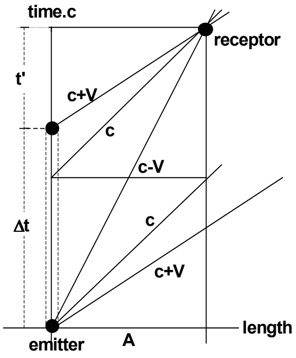
2.3 The elementary charges

Fields of forces are clearly matter-bound. Especially the link between the electric fields and the *ec*'s is beyond doubt. That is the reason why the *ec*'s must be the sources of the hypothetical *pp*'s. There are reasons (see chapter 9) to adopt the idea that *ec*'s are about 10^{15} times larger than the *pp*'s. This offers the possibility to consider an *ec* as a (very powerful) electric field itself. Probably an *ec* may be imagined as a spherical, self-supporting electric field, creating continuously new *pp*'s in a thin mantle composed of cohering *pp*'s (*Spp*'s). The *pp*'s emitted into the inner *ec* will inflate the structure by repulsing reactions in the opposite wall until equilibrium is reached. The inside directed *pp*-emission is supported by an emission into the outer space. As *pp*'s cannot have an overall mass, the inner *ec* must be mass-less too. However, the continuous production of *pp*'s causes a force of reaction if the *ec* is accelerated. That is identical to the phenomenon of *inertia* (see: Explanations, 153). The properties of the electric field, working between *ec*'s, must be a week reflection of the events in the inner *ec*.

Each point on the inside of the *ec*-mantle will be influenced at any moment by numerous other points with the velocity of light. This influence is happening, however, by means of *pp*'s converging into that point with velocities between c+V and c-V. Therefore, that point will undergo in one moment the average influence from a cohering series of points in the opposite wall over a distinct period of time (Δt, see next paragraph). There are two ways to describe the Δt-period: one with the exertion of force between resting points (one direction) and one between relatively moving points.

1. Period of *pp*-convergence.

Figure 3



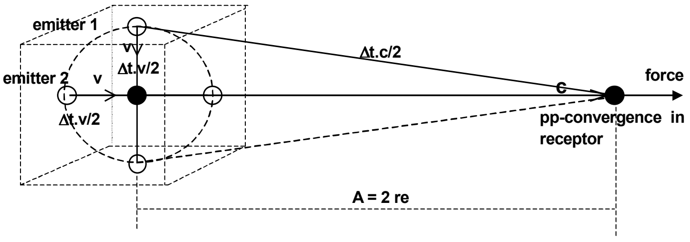
The energons inside an *ec*, acting instantaneously on some region, have been emitted by another region during a period of time: the **period of *pp*-convergence (Δt)**. The receiving area cannot experience this period as being a period of time: in fact it is a hidden period for that area. The length of the period is determined by the distance *A* (the spread of *pp*-velocities are constants) see **fig.3**. In this diagram, time has been depicted again along the ordinate as a length (t×c). The distance *A* between the emitter and the receptor is designated along the abscissa. The paths through the time-length area of the slowest and the fastest *pp*'s are indicated by (c-V) and (c+V), respectively. From this diagram can be derived:

$\Delta t + A/(c+V) = A/(c-V)$, from which $\mathbf{\Delta t = 2A.V/(c^2-V^2)}$.

2. Transversal positions of the points of action.

Trying to evaluate the forces, sent by the points of action (*PA*) of a spherical collection in the *ec*-mantle, it is helpful to make a comparison with the mass-center of a distant emitter, collecting all the forces as coming from that center. So, one can say that in all cases the forces, sent along all diameters through the centre, can be seen as coming from that center. That makes the following thesis valid:

Figure 4



All diameters of a Δt-area must exert equal forces at an extern receptor.

In **Figure 4** a small *Δt*-region of *pp*-emission at the inner side of the *ec*-mantle is indicated by a sphere inside a cube. *Emitter 1* is thought to have a moderate relative velocity *v* transversally to a receptor, situated at the opposite side of the mantle (at distance A = 2.r_e). Though the exertion of the forces takes place at one moment, the tracks of the effective *pp*'s can geometrically be limited between:

$(\Delta t.c/2)^2$ and $(\Delta t.c/2)^2 - (\Delta t.v/2)^2$.

Unification of those tracks: $(\Delta t.c/2)^2 / \{(\Delta t.c/2)^2 - (\Delta t.v/2)^2\} = 1 / \{1-(v/c)^2\} \leftrightarrow 1$, needs a range of correcting factors with a geometric average of:

$$\sqrt{1 \times \left\{\frac{1}{1-(v/c)^2}\right\}} = \frac{1}{\sqrt{1-(v/c)^2}} = \frac{f_v}{f_0}$$

This factor is identical to the *gamma-factor* (*Lorentz -Fitzgerald*).

The same reasoning is valid for the second half of the track *v.Δt.* Thus, the factor has also to be valid for the track *v.Δt*.

The *pp*-action along the unified distances must have been intensified to:

$f_v = f_o.\{1-(v/c)^2\}^{-1/2}$. As *v* is relatively small, the equation may be simplified to:

$f_v \approx f_o.\{1+(v/c)^2\}^{1/2}$, or $\mathbf{f_v \approx f_o.(1+v^2/2c^2)}$.

2a. Axial positions of the points of action.

In figure 4 the motion of *emitter 2* along the diameter is depicted too, emitting *pp*'s to the receptor during the same period *Δt* and acting along the extension of the track *Δt.v*. The *arithmetic average* of the forces, exerted on the receptor over the period *Δt,* can be found by integration of the influences of each *pp*:

$$f_v = \int_{-\Delta t/2}^{\Delta t/2} \frac{k(\delta e)^2 \cdot dt}{(A-v\cdot t)^2} = \frac{k(\delta e)^2}{\Delta t.v} \cdot \left[\frac{1}{A-v.t}\right]_{-\Delta t/2}^{\Delta t/2} = \frac{k(\delta e)^2}{\Delta t.v} \cdot \left[\frac{\Delta t.v}{A^2-(\Delta t.v/2)^2}\right] = f_0 \cdot \frac{1}{1-(v\cdot \Delta t/2A)^2}$$

thus $\mathbf{f_v \approx f_o.\{ 1+(v.\Delta t/2A)^2 \}}$, where $f_o = k(\delta e/A)^2$ and $k = (4\pi\varepsilon_o)^{-1}$.

The arithmetic and the geometric averages must be equal, so that:

$\{ 1+(v^2/2c^2) \} = \{ 1+(v.\Delta t/2A)^2 \}$, or $(\Delta t)^2 = 2A^2/c^2$, thus: $\mathbf{\Delta t = (\pm)A.\sqrt{2}/c}$.

However, another equation describing *Δt* has been found before: $\mathbf{\Delta t = 2A.V/(c^2-V^2)}$.

From the two equations can be derived: $(\sqrt{2}.V^2/c) + 2V - c\sqrt{2} = 0$, or

$\mathbf{V = c(\sqrt{3}-1)/\sqrt{2} = 0.5176.c}$, causing an additional *pp*-velocity in the *ec*'s:

c ± ½c ± 0.0176.c.

A consequence of this additional velocity is that each radiating volume of the *ec*-mantle with a diameter of $0.0176\times\sqrt{2}\times2\ r_e = 0.05.\ r_e$ must be able to communicate with the other side of the mantle with a complete set of *pp*-velocities. However that diameter is much too thick for the very thin mantle (see page 134).

The velocity, $v_s = \pm0.0176.c$, must have a stabilizing effect on the *ec* and may have set itself as an *ec*-pulsation (chapter 7) in the first moment of the beginning universe. It is interesting to see that the value of Δt $(A\sqrt{2}/c)$ is equal to the diagonal of the square, formed by the units of length and time in fig.3, and that the factor $(\sqrt{3}-1)/\sqrt{2}$ can be met in the ratio between the elements of a cube, $(l-r)/d$ or $d/(l+r)$, in which l is the cube's diagonal, r is the edge and d is the diagonal of a plane of the cube. It is important to note that with the equalizing of the two equations for transversal and axial source-ranges *the velocity v* disappears, which means that it does not matter whether the forces are considered to be the average from a row of positions, equipped with *pp*-emitters, or from one moving *pp*-emitter.

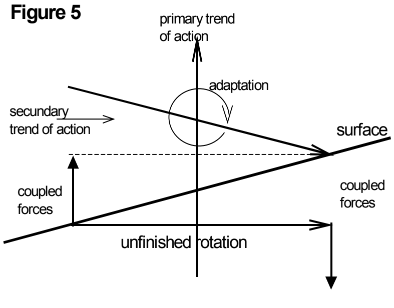
The equalizing of the forces, exerted by the transversal and axial ranges of sources, cannot be instantaneous, because the pulsating velocities are not all present at the same moment. The stabilizing must rather happen averagely over a short period of time (Δt_{re}, see chapter 7).

In the inner ec the fundamental instability, caused by the differently acting axial and transversal tracks in emitting regions on the opposite regions in the ec-mantle, is compensated by a pulsating movement of that mantle, which makes that the *geometrical average* (distances) is unified with the *arithmetical average* (*pp*-amount).

Spin of the elementary charges.

The average creation of *pp*'s is thought to happen from a point in the *ec*-mantle (P_A) into the outside and into the inner space, at which two pairs of arising poles spiral as widening cones. If the direction of emission is perpendicular to the *ec*-mantle the poles, forming one *pp*, leave the surface at once and the resulting *pp* has its full *angular momentum*. However, if the emission happens at an oblique angle with the mantle the two *pp*-poles cannot leave the *ec*-mantle at the same time, which would cause a loss of angular momentum. This may be compensated in the *Spp*-layer by turning the axis of rotation of the poles with respect to the direction of emission, which causes an extra angular momentum.

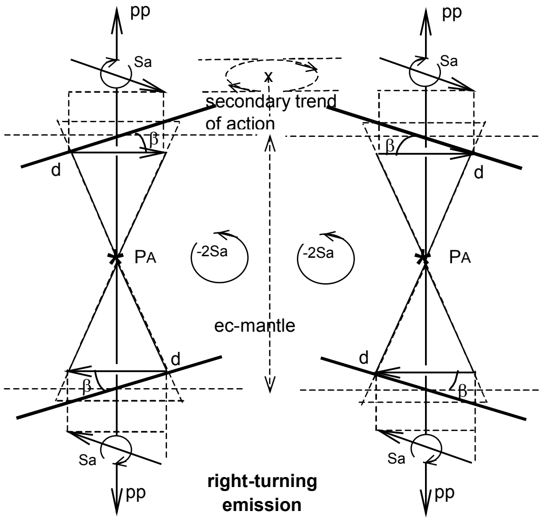
Figure 5



The individual compensations only depend on the sense of pp-rotation and the extent of the oblique angle with respect to the big circle through the direction of pp-emission, but not on the direction of that angle, which excludes an overall compensation for the whole ec.

In the next reasoning the turning of the *pp*-axes, with the influences thereof, will averagely be described for right-turning *pp*'s (one kind of ec). In the case of left-turning *pp*'s the arrows of rotation have to be drawn oppositely. **Figure 5** indicates that the unfinished spiraling plane is forced into a plane with an right-turning angle with respect to the sending direction. Seen from the left (secondary trend of action) the rotation is right-turning.

Figure 6 **Figure 6a**



In the **Figures 6** and **6a** the possibilities for right-turning *pp*'s are given in more detail. The cones, that represent the creation of the *pp*'s, touch the *ec*-surfaces in one point (***d***). After leaving the mantle*,* the *pp*-axes have been turned into a position that causes an extra right-turning angular momentum ***S_a*** in the plane through the big circle, as seen into the appropriate direction (see secondary trend of action). This turning is effectuated by the *ec*-mantle and leaves temporarily a 'guilt' of ***-2Sa*** in this mantle. It can be reasoned that this *pp*-adaptation makes that an *ec* cannot be seen equally from each direction. **Figure 7** depicts the hemisphere of an *ec* as seen from C, perpendicular above the centre. The thin arrows S_a give the direction of the *pp*-adaptation along some big circles (bc). It can easy be seen that the direction of the resulting adaptation must follow the big arrow ***S***. However, the relation with other *ec*'s during the (short) period of *ec*-creation must play a fundamental role in determining the definitive spin-direction. To avoid an overall spin of the arising *ec*-plasma, all possible *ec*-spin directions must have been evenly divided over the *ec*'s.

Figure 7

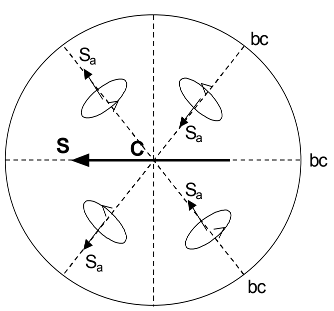
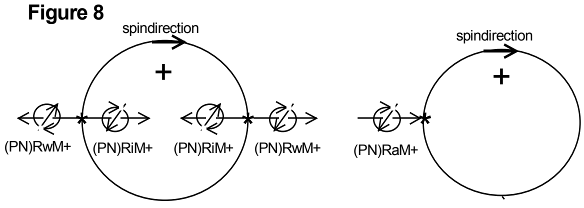


Figure 8



In **figure 8** an imaginary *pp*-resultant, corresponding to all the right-turning emissions into one direction for the inside as well as for the outside space, have been given along a line through the *ec*-centre. This average creation can be conceived as giving rise to double structures of positive- and negative poles, turning right with respect to the direction of emission and approaching- or withdrawing the *ec*'s, noted as: *(PN)Ra* or *(PN)Rw*. The extra angular momentum can be indicated by: *(PN)RaM+* or *(PN)RwM+*. As each creation leaves a guilt with respect to the zero-situation, only the two *pp*'s, indicated by *(PN)RiM+ (*intern the *pp)* can pay off the left guilt by annihilating the opposite *pp*'s at the other side of the inner *ec*-wall. The *pp*'s *(PN)RwM+,* but now in a role of *(PN)RaM+* for another *ec,* can transfer information about its ***spin****.* If that *ec* has an equal charge, the effect is a repulsing force and an influence on its spin. **Figure 9** depicts this annihilating reaction of a right-turning *pp* with spin-information (S_a) on an *ec* with the charge of the *pp*-source. The extra angular momentum (S_a) will be returned to the *ec*-mantle. This causes an influence on the spin of the mantle, that is not compensated by an opposite event like the emissions in figure 6. Besides this extra angular momentum, the regular force ***f*** along the direction of motion is exerted as a result of the *pp*-annihilation (primary trend of action). **Figure 10** depicts annihilating reactions of two *(PN)RiM+ pp'*s, looking also at the existing spin. The $\mathbf{S_a}$ has grown from A to S and disappeared from *S* to *B.*

Figure 9

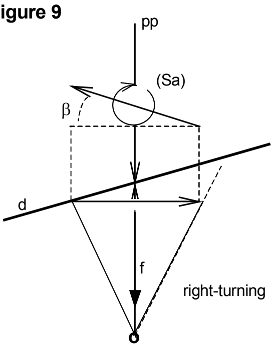
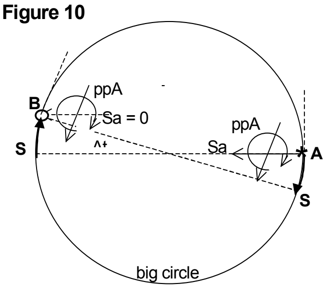


Figure 10



The reality of force exertion.

During the analyses in this study it became clear that the **transport of forces is not a fact of individual *pp*'s**. Because of the already existing *pp*-density in space it must be seen as a **wave of colliding *pp*'s**, with the average velocity *c*, initiated by their high-energetic emission. At the reception by *ec*'s the reversed action happens, which makes that the transport still may be seen as caused by individual *pp*'s (see Explanations,170).