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Dear Dr. Martynov:

Thank you for submitting your manuscript to SCIENCE. We regret to say that on the scale relative to other manuscripts received at the same time, your paper was given a lower priority rating. We are therefore returning the manuscript copies without delay so that you can seek publication elsewhere.

The editorial on page 249 of our 18 January 1985 issue details some of the procedures we have established in an effort to evaluate manuscripts promptly and fairly. As you are aware, we receive many more papers than we can accept, and most of the work sent to us is publishable. We must make decisions based on, for example, area of discipline, novelty, and significance, over and above the usual criterion of research acceptable for more specialized journals. Our decision is not, therefore, a reflection of the quality of your research but rather of our stringent space limitations.

Sincerely,

Monica M Bradford

Monica M. Bradford
Acting Managing Editor

MMB/mw
Enclosures

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ANNOTATION

Salam and Weinberg's approach to the theory of elektromagnetic, strong and weak interactions unification is used for getting the four interactions entire field constant. On this basis, the structural model of elementary particles with the planckon in centre is offered. Furthermore, there is some comment on hypothetic particles, called minimons, which appear in theory nowadays.

The Universe evolution is considered to be one of many, having originated before "the Great Collapse". The evaluation of "the Great Collapse" is given as a result of the Universe compression up to the Planck density and hypothetic particles^s decay, with minimon separation to planckeons (maximons).

Hence here follows the expansion according to De Sitter's scenario.

PARTICLES STRUCTURE AND UNIVERSE EXPANSION

by V. A. Martynov.

Nowadays the mass spectrum of hypothetic elementary particles extends from the accepted by certain physicists plankeon or maximon with the mass of $2.2 \cdot 10^{-5}$ gr. to neutrino determined by the mass equal to $5 \cdot 10^{-32}$ gr. However some correlations in the micro world are pointing out to a probable existance of much lighter particles, which may be called, by analogy, minimons with the mass of $3.5 \cdot 10^{-35}$ grammes. Practically these particles do not interact with substance now. But during the first stage of the Universe expansion they influenced greatly the process of evolution. These were the very moments when there reigned the entire unification of all four interactions.

The way, accepted by physics for its development, based on the well known fact about inequality of a "bare" electronic charge to a charge surrounded by virtual particles and antiparticles, will allow us to consider the time interval with the start point $t \approx 10^{-43}$ sec. This approach allowed to combine into a theory the electromagnetic and weak interaction first, and strong interaction afterwards.

The combination of three interactions is known to be realized with the particle energies of 10^{15} , and the expression, in the valuable view, for the mass of the super heavy bosons M_{WES} , taking part in this three unit interaction, looks like this

$$1_n \frac{M_{WES}}{m_p} \sim 1/4 \alpha_e \Rightarrow \alpha_{WES} = m_p \cdot \exp(1/4 \alpha_e),$$

where

m_p = the proton mass;

α_e = the fine structure constant.

Under these conditions the interaction constants take equal value:

$$\alpha_e = \alpha_S = \alpha_{we} = \alpha_{wes}; \alpha_{wes} \approx 1/35.$$

It seems that a corresponding approach is available for the combination of four interactions.

Landau and Pomeranchuk showed that with the impulses approximating Plank's impulses one electron charge turns into infinity, and the boundaries of the quantum electrodynamics application are determined by the following:

$$\ln \alpha_g \sim -(\alpha_e)^{-1}; \quad [1]$$

$$\text{where } \alpha_g = \frac{G \cdot M^2}{\hbar \cdot c},$$

This ratio comes into action for the regions having the particle mass greater than some value of $m \geq \left(\frac{\alpha_e \cdot \hbar \cdot c}{G} \right)^{1/2}$.

For getting the similar correlation they know another approach. It is formed while comparing the time of the proton existence and the Universe:

$$\begin{aligned} t_{\mathcal{U}} &= \frac{G \cdot M_{\mathcal{U}}}{c^3} \Rightarrow M_{\mathcal{U}} = \alpha_{gp}^{-2} \cdot m_p \Rightarrow t_{\mathcal{U}} = G \cdot \alpha_{gp}^{-2} \cdot m_p / c^3; \\ t_p &\approx \alpha_e^{-2} \cdot \exp(1/\alpha_e) \cdot \frac{\hbar}{m_p \cdot c^2}; \\ t_p &> t_{\mathcal{U}} \Rightarrow \ln \alpha_g > -(\alpha_e)^{-1}; \quad [2] \end{aligned}$$

It came out that the correlation [2] was to be fulfilled for $m = m_p$. To carry out the correlation [1] you should have a particle with its mass of $m = m_m \approx 10^{-35}$ gr./minimon/ entered the value of α_g . Having found the values of $t_{\mathcal{U}}$ and t_p by using the minimon mass m_m instead of M_p , we get the following

$$\ln \frac{G \cdot m^2 m}{\hbar \cdot c} \sim -(\alpha_e)^{-1} \Rightarrow 137 \equiv 137; \quad [3]$$

This expression can be converted to

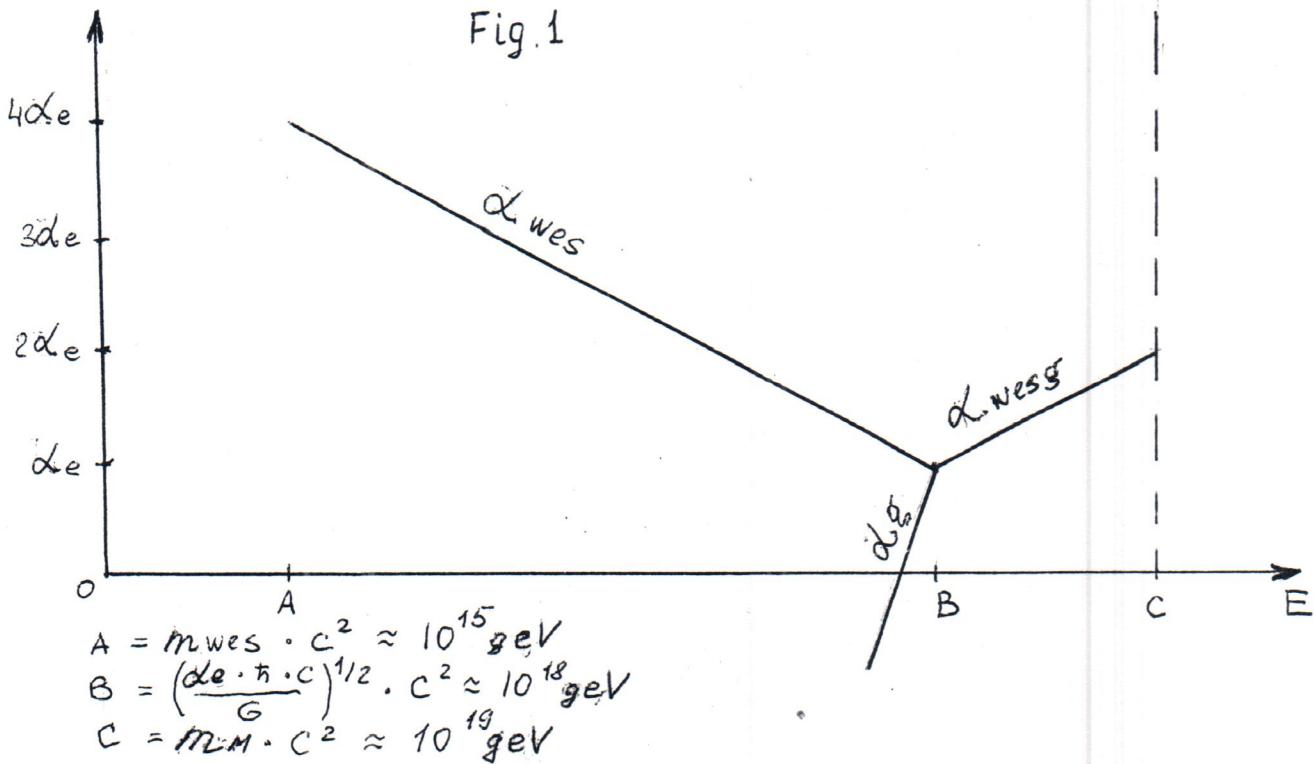
$$\ln \frac{G \cdot m^2 m}{\hbar \cdot c} \sim -(\alpha_e)^{-1} \Rightarrow \ln \frac{m^2 m}{m^2 M} \sim -(\alpha_e)^{-1} \Rightarrow \ln \frac{m}{m_M} \geq \frac{1}{2} \alpha_e,$$

where $m_M = \left(\frac{\hbar \cdot c}{G} \right)^{1/2}$, the plankeon mass /maximon/.

So, having $m = m_m$, we get $\alpha_{wesg} = 2 \alpha_e$. By analogy, having $m \approx \left(\frac{\alpha_e \cdot \hbar \cdot c}{G} \right)^{1/2}$, we get $\alpha_{wesg} = \alpha_g = \frac{G \cdot m^2 g}{\hbar \cdot c} = \alpha_e$.

Now let us create the scheme of the interaction constants' alter-

ing, starting with the energy value of 10^{15} .



So the combination of four interactions starts at the point B with the energies $E = \left(\frac{\alpha_e \cdot \hbar \cdot c}{G}\right)^{1/2} \cdot c^2 \Rightarrow E = \sqrt{\alpha_e \cdot m_m \cdot c^2}$.

Besides, $\alpha_s = \alpha_{wesg}$ and equals to α_e . Furthermore α_{wesg} increases up to the value of $2\alpha_e$, with the masses $m = m_m$.

Here arises the question concerning the structure of the particles. It is suggestive that each particle consists of a maximon, taking part in all the four interactions, and of margins of the well known virtual particles situated layer-like around it. These fields are generated by the interaction of the maximon with vacuum and supported by it. The real particle mass is determined by the difference between the maximon mass and the mass of some equivalent energy that keeps it inside the particle. The real particle parameters and probability of these or other particles generation is defined by combined influence of the virtual particle fields, by the maximon influence, by the energy of interacting particles and some section of reactions. The argument to this may

be the fact about the possibility of the expression of the particle energies through the energy of the gravitational field of a maximon:

$$E = \frac{G \cdot m_M^2}{R} = m \cdot c^2; \quad \text{if } R \rightarrow h/m \cdot c; \text{ where "m" is the mass of any particle.}$$

Here arises the idea of some new super power energy sources. If the particles come near, reaching the Planck distances of $\sim 10^{-33}$ cm, the particle structure breaks down and they stop their existence, giving the may for maximons to came to life instead of them.

The result of this event is the extraction of some really fantastic energy from one minimon disintegration that equals to:

$$E = \frac{m_m \cdot m_M}{m_m} \cdot c^2; [4]$$

The minimons' decay does not only end in planckeon (maximon) origination. Similar to quarks, That react with other particles but do not exist in "bare" shape, they react immediately between themselves with the consequent origination of minimons and gravitons anew, which accumulate the connection energy of planckeons inside minimons.

The gravitons in the return interacting, give rise to photons. Thus the scenario of the hot Universe evolution is performed.

The Great explosion of our Universe may be suggested to be a consequence of the reaction mentioned above. To this you should accept that the compression came into being before the expansion, that ended in explosion and expansion, when the Universe reached the density of $\rho \approx 10^{94} \text{ gr/cm}^2$. Let us consider the problem in more detail.

Assume, that minimons benefit primarily to the Universe mass. Their quantity will be then

$$n = M_u / m_m = 10^{56} / 10^{-35} \approx 10^{91}$$

and Compton's wave length:

$$\lambda = \frac{h}{m_m \cdot c} \approx 3,5 \cdot 10^{-3} \text{ cm.}$$

During the Universe collapse the minimons will come nearer to each other, with Planck distance $\sim 10^{-33}$ cm., that corresponds to one Compton's wave length of a maximon, and the Universe capacity and its radius will be equal to:

$$V = n \cdot \lambda^3 \approx 10^{91} \cdot (10^{-33})^3 \approx 10^{-8} \text{ cm.}$$

$$R = \sqrt[3]{V} \approx \sqrt[3]{10^{-8}} \approx 3,5 \cdot 10^{-3} \text{ cm.}$$

So, though it seems to be rather paradoxical, the Universe radius

compressed up to the Planck density, has turned out to be equal to the Compton's wave length of a minimon $\sim 3,5 \cdot 10^{-3}$ cm.

Hence, during the collapse up to the radius of $\sim 3,5 \cdot 10^{-3}$ cm., the gravitational compression exceeds significantly all of the known kinetic energy sources, capable to stop the compression or to force it back. The potential energy of a gravitation at that moment equals to

$$E_{gr} = \frac{G \cdot M_u^2}{R} \approx 10^{107} \text{ erg};$$

and the energy from complete annihilation of entire substance of the Universe will constitute only:

$$E_\gamma = M_u \cdot c^2 \approx 10^{77} \text{ erg};$$

It looks like there is no capability to stop the collapse and generation of "the black hole". However, these energies get equal already during the next instant. To confirm this, let us consider the following:

the Universe mass, as known, can be received through the proton mass:

$$M_u = \alpha_{gp}^{-2} \cdot m_p;$$

where $\alpha_{gp} = \frac{G \cdot m_p^2}{\hbar \cdot c} \approx 10^{-38};$

and also through the minimon mass:

$$M_u = \alpha_{gm}^{-3/2} \cdot m_m;$$

where $\alpha_{gm} = \frac{G \cdot m_m^2}{\hbar \cdot c} \approx 10^{-60};$

Having converted the last correlation for the Universe mass, we can get the equation for the gravitational and kinetic energy:

$$M_u = \alpha_{gm}^{-3/2} \cdot m_m \Rightarrow \frac{GM_u^2}{R_u} \sim \frac{m_m}{m_m} \cdot M_u \cdot c^2; [5]$$

with $R_u \rightarrow \hbar/m_m \cdot c;$

As it can be seen, the right part of the equation [5] and the correlation [4] are identical, only the equation [4] is for one particle and the right part of the equation [5] is for all the Universe particles. The equation [5] is also reflecting the equality of pressure and radiation:

$$P = -\varepsilon;$$

and this condition is realized in the model of expending Universe by De Sitter.

Thus the evolution is scenario, in our view, began after the generation from vacuum of the clouds, consisting of elementary particles. Some clouds were getting thicker, some dispersed. One of the clouds had the mass equal to $\sim 10^{56}$ gr. and collapsed. Having reached the "Planck" density of $\sim 10^{94}$ gr/cm³ and the size of $\sim 10^{-3}$ cm., it exploded and generated our Universe, as a result of minimons to maximons decay. It should be noted that the concentration of minimons and photons in the past and now equal to

$$n_r/n_m \sim 1;$$

that testifies to the indivisible process of their generation. It is also interesting to note that the density of radiation of the exploded Universe E_u is strictly identical to the density of radiation of the absolutely black body $E_{B.B.}$.

$$E_u = E_u/V_u = 10^{107}/10^{-8} \approx 10^{115} \frac{\text{erg}}{\text{cm}^3}; \quad E_{B.B.} = G \cdot T_m^4 \approx 10^{115} \frac{\text{erg}}{\text{cm}^3};$$

The problem of the surrounding world origination, its variety, has always been an exciting point to the mind. The far the human mind was going along the way of acquiring the knowledge, the more variety it saw in the material world and the less chances seemed to be left to realize its entity.

One of the most interesting mysteries of physics, reflecting the search for this entity, is a coincidence of the great and small values derived from different constants. They were Veil, Edington and Dirac, who first noted them.

These parameters include;

- M_u - the Universe mass;
- ρ_u - its density;
- R_u - its radius;
- H - Hubble's parameter;
- m - the mass of one electron/proton;
- e - one electron charge;
- γ - one electron/proton radius;
- c - velocity of light;
- G - the gravitational constant;
- \hbar - Planck's constant.

It was noted that the ratio of the gravitational radius to the electric one was of the same order as the ratio of the electric radius to the parameter of macro- and microworld were giving great coincident dimension less values or the values equal to the unity.

The first value can be received as a result of the electromagnetic and gravitational interactioous comparison.

$$Q_1 = e^2/Gm_e^2 \approx 10^{-40}; \quad m_e - \text{one electron mass};$$

The second value is determined as the ratio of the Universe radius to the classical electron radius:

$$Q_2 = R_u/ze = \frac{c/H}{e^2/m_e \cdot c^2} = \frac{m_e \cdot c^3}{H \cdot e^2} \approx 10^{-40};$$

The third value is derived from the comparison of the electron density with the density of substance in the Universe:

$$Q_3 = \frac{m_e/ze^3}{\rho} \approx 10^{-40};$$

The fourth value is the value, inverse to the gravitational constant α_g

$$Q_4 = \alpha_g^{-1} = \frac{\hbar \cdot c}{G \cdot m_p^2} \approx 10^{-40};$$

The fifth value is a square root from the quantity of the nucleons in the Universe:

$$Q_5 = \sqrt{N} \approx \sqrt{10^{80}} \approx 10^{-40}; \quad Q_6 = G \cdot \rho_u / H^2 \approx 1; \quad \text{also:}$$

What is it? Is it an accident occurrence or some unknown regularity? There is no answer to this question now and then, though there have passed dozens of years ever since, and our knowledge has increased.

The constants, operated by the outstanding physicists, included the masses of the known particles of those times: protons and electrons. Nowadays the particles spectrum expanded greatly. There were discovered some new particles, unknown by the time, which had different masses, in theoretical works they widely used hypothetical particles from that moment on.

As we have mentioned above, the maximon is the most heavy particles among the hypothetical particles. It is capable of four interactions. They generate at the boundary of two worlds - there, where the micro-world comes to its end and the macroworld starts; its way. In this sense this particle represents in itself a centaur with all the features of an elementary particle and of a macro object of "the black hole". In connection with this, let us trace the dimensionless value variability in the Universe, compressed up to the Planck density, where instead

of the proton and electron mass and radius there should appear the mass and classical radius of maximon.

We write them down in the same order as above:

$$Q_{1M} = e^2/G \cdot m_M^2 \approx 1; \quad m_M = \sqrt{\hbar \cdot c / G};$$

$$Q_{2M} = R_u / r_M \approx 10^{30}; \quad R_u \approx 10^{-3} \text{ cm}; \quad r_M \approx 10^{-33} \text{ cm};$$

$$Q_{3M} = \frac{m_M / r_M^3}{\rho_M} \approx 1; \quad \rho_M \approx 10^{94} \text{ gr/cm}^3;$$

$$Q_{4M} = \hbar \cdot c / G \cdot m_M^2 \approx 1;$$

$$Q_{5M} = \sqrt{N} = \sqrt{M_u / m_M} \approx 10^{30};$$

$$Q_{6M} = G \cdot \rho_u / H^2 \approx (10^{30})^4; \quad \rho_u \approx 10^{94} \text{ gr/cm}^3;$$

Thus we have got the values of $\sim (10^{30})^n$ and 1, where $n=1,4$ instead of the values of $\sim 10^{40}$ and 1. The most attracting thing is the ratio of the mass of some object of the macro-and microworlds. If we add the mass of our Earth, $M_E \sim 10^{27}$ gr., to the masses, mentioned in this paper (let us also add a graviton mass, stated in some hypotheses), we get the following:

$$M_u : M_E : m_M : m_m : m_g = 10^{56} : 10^{27} : 10^{-5} : 10^{-35} : 10^{-65} \quad \text{where } n=1\dots 4 \\ = (10^{30})^n$$

We have got the ratio, equal to $\sim (10^{30})^n$, and try to find the explanation of this strang value later on.

It's peculiar that in this correlation there gathered the object' masses, having the great significance for the formation of the anthropoprinciple in cosmology. Really, if the Universe had even the slightest deviation in the mass from the existing one, the world would never have accepted the complex forms of its development. On the other hand, the Earth mass turned out to be ideally fit for life origination. The minimons and maximons are the particles, limited in their mass in the Universe. They define its Past, Present and Future. The gravitons provided the formation of physical object with complicated structure, on one of which there originated life one day.

It is probable, that there is a deep connection, hidden in this correlation, that reflects the world entity. Perhaps, the foundation for the matter development up to its highest status- intelligence-has been laid here.

Let us given some more examples of the values $\sim (10^{30})^n$ reappearing. We should enter the following parameters for this:

$S_1 = t_u : t :$	$t_u \approx 10^{17} \text{ sec}$ - the Universe existance time;
$t_M \approx (10^{30})^2$	$t \approx 10^{13} \text{ sec}$ - the most particles' desay time;
	$t_M \approx 10^{-43} \text{ sec}$ - the Planck time;
$S_2 = \rho_E : \rho_u \sim$ $\sim 10^{30}$	$\rho_E \approx 1 \text{ gr/cm}^3$ - the Earth density; $\rho_u \approx 10^{-29} \text{ gr/cm}^3$ - the Universe density nowadays;
$S_3 = T : T_M \approx$ $\approx 10^{30}$	$T_M \approx 10^{32} \text{ K}$ - the Planck temperature at the momont of the Universe collapse; $T \approx 10^{20} \text{ K}$ - the Universe temperature by the very beginning of galaxies and stars formation;
$S_4 \approx (10^{30})^3$	$N_m \approx 10^{91}$ - the quantity of minimons in the Universe;
$S_5 \approx 10^{30}$	$N \approx 10^{30}$ - the number of protons in the human body;
$S_6 = W_u : W \approx$ $\approx (10^{30})^3$	$W \approx 10^{30}$ - the number of information bits in the brain of a human being; $W_u \approx 10^{90}$ - the number of information bits in the Universe;
$S_7 = R_u : R_c :$ $; Z_M \approx (10^{30})^2$	$R_u \approx 10^{28} \text{ cm}$ - the Universe dimension nowadays; $R_c \approx 10^3 \text{ cm}$ - the Universe dimension at the moment of collaps; $Z_M \approx 10^{-33} \text{ cm}$ - the Planck length.

As it can be seen, here we have the same values of $\sim (10^{30})^n$, where $n=1,2$. What is the reason for such strang values to occur? The thing evidently lies in some symmetries and cyclic recurrence in the matter evolution, taking into account its features of a self organizing system. We observe the same thing in the environmental, in the evolution of biological and social systems. As far as the time relations are concerned, it is the solar cyclic recurrence, the change of daytime and nighttime, the cycles of some organisms' evolution, of the evolution of ecological systems, biological sphere. Here we deal with various time correlations, having constansvalues. Even in the development of the social systems some cyclic regularities can be found. We can judge about it from the significant dates in the history of mankind, though there are no strictly defined time boundaries here.

The relation between the elements' masses and particles' masses can be traced throughout atomic physics and elementary particle physics, in biology between the mass of brain, the duration of intrauterine development and duration of organisms and also in many other spheres.

Thus, the existence of the already mentioned correlations and great magnitudes is not an exceptional event; on the contrary, the absence of them would be rather strang. It is beyond any question obvious that all the defined correlations have to be organically interspersed with the theory, that will be claiming the description of the processes of the macro- and microworld in their entity, reflecting the quantum character of matter evolution.

A handwritten signature in black ink, appearing to read "SLB".