Study in subatomic structure as extreme task for quantum mechanics

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Study in subatomic structure as extreme task for quantum mechanics

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Abstract. It is shown that the known task of single-electron atom can be established with its own solution of fine-structure constant. Moreover, this approach may relate to electron transition directly to the proton structure, that with a hyper-fine structure like the Lamb shift of hydrogen atom is specifically associated. Such highlighted result was expanded accordingly for the multiple-charge states, as beyond the existing classification of the Standard Model. Here is possible a certain prediction for the mass values by type the meson-boson particles. In particular, mass value for the Higgs boson has been modeled close enough to the experimental result. In this way a high-energy sequence for the exotic subatomic particles like the Higgs boson may be further revealed.

1 Introduction

Within the supposed task it would be suitable to note the Feynman sentence about the fine-structure constant, where does the confession follow: "But what is obvious is that we do not have a good mathematical apparatus for describing quantum electrodynamics, such a bunch of words to describe the relationship between n , j and m , e - is not real math..." [1].

Indeed, the same analysis of the Lamb shift might look more like a fit using an empirical expression of fine-structure constant. Most likely, such a problem must be related to the interdependence of electrical interaction in space.

This is what it is a goal, in general, to establish an essence of the electronic phenomenon in subatomic structure.

But this does not imply a probabilistic task relative to the charged particle with electronic mass. For instance, at some location for a quantum particle, the instantaneous re-installation in own field would be required. It would not make sense due limiting velocity in the whole spatial area, otherwise an electron should be manifested before itself in electric field at infinity.

Figuratively, an apparent paradox of mechanistic electron with incommensurate mass in purely electric effect can be illustrated (in Fig. 1).

Fig. 1. Schematic electric process with an electron, ostensibly possessing its own mass. Presumably, a certain quantum of electromagnetic energy causes a photo-electron that must replace the orbital electron for restoring of ionized atom. Essentially a question is, whether there is a difference between these "electrons"? Indeed, it would be an ambiguous transfer in electric circuit for electronic substance, instead of the electromagnetic transformation.

Thus, with a well-known task for hydrogen-like atom, respectively, the stationary Schrödinger equation was considered. It is the task about a motion of charged particle in the central forces field of Coulomb's interaction [2]).

In a manner, the so called "electromagnetic interpretation" of wave function is mentioned $e \in \Psi^2$ - it is currently forgotten interpretation for a distribution of the elementary charge in field of charged nucleus, by the Schrödinger work [2].

Let the above presupposition assigned to electronic scattering at infinity, according with the basic electronic value, by the Einstein formula $E = mc^2$
In this attempt the stationary Schrödinger equation is reviewed

$$-\frac{\hbar^2}{2m} \nabla^2 \psi + V \psi = \mathcal{E} \psi$$

- where, from a postulated Coulomb interaction $V(r) \sim e^2/r$ - there are electronic levels $\mathcal{E} = \mathcal{E}(n)$ (in system of principal quantum numbers $n = 1, 2, \dots$).

As far as this is argued, there is the modified equation

$$-E r^2 \nabla^2 \psi + V \psi = E \psi \quad (1)$$

- where acceptable constant value is redefined $E = mc^2 = \text{const}$ - provided the symbolic Bohr radius $r = r_0$ (See Designations in Section 1).

Then, accordingly, not postulated dependence for Coulomb's potential has place

$$V(r) \sim n \frac{e^2}{r} \quad (2)$$

- which from charge coefficient by principal quantum numbers follows $n = 1, 2, \dots$ (that is, a multiply charged nucleus as if surrounded with electron "shell").

Formally, this equation under known solution of the spherical functions is revealed (in work [3]).

In the same time, for the stationary Schrödinger equation, a condition of orthogonality is not performed, since an applied dependency $\mathcal{E}(n) \in V$

The orthogonally compatible solution should not be dependent from own numbers $\psi \neq \psi(n)$ - that only for constant value has place (in form $V(r) \in E$).

That so solution of the radial part in Eq. (1) - is further investigated

$$\psi(r) = Q_n^l(r) \cdot \exp(-\frac{1}{2} r) \quad (3)$$

- where corresponding orthogonal system is highlighted

$$Q_n^l(r) = r^l L_{n+l}^{2l+1}(r)$$

That recorded through the generalized orthogonal Laguerre polynomials, according with the quadratically integrable expression

$$\int_0^\infty L_{n+l}^{2l+1}(t) L_{n'+l}^{2l+1}(t) t^{2l+1} \exp(-t) dt = 0 \quad (n' \neq n)$$

(the orbital numbers $l = 0, 1, \dots, n-1$ - in system of principal numbers $n = 1, 2, \dots$).

Designations of task Hereinafter, from out fundamental constants, a relative constant on electric interaction is symbolically designated $C \sim e^2$

By the known Sommerfeld work about the fine-structure constant

$$C = \frac{\dot{c}}{c} = \frac{\dot{r}}{2\pi r}$$

- there is a relativistic ratio - at achievable limit velocity $c = c_0$ - on main electronic orbit $r = r_0$ - of Bohr's radius. The Compton wavelength is known $\dot{r} = \frac{2\pi\hbar}{mc}$ - where a postulated law on "moment of momentum" (in form the Planck constant)

$$r m \dot{c} = \frac{1}{2\pi} \dot{r} m c = \hbar$$

From here the rest energy for electron is

$$E = mc^2 = \frac{2\pi\hbar c}{\dot{r}}$$

There is electron increment of the ground state of atom (ionization energy)

$$\Delta E = \mathcal{E}(n=1) = \frac{1}{2} C^2 E$$

2 Method by spherically symmetric potential

2.1 Assumption about scattering function in infinity

The electrostatic theorem by the Gauss-Ostrogradsky formula is known

$$\oint_S \mathbf{F} \cdot d\mathbf{S} \sim 4\pi q$$

- where, from a flow of electric displacement through closed surface $F(r) \sim \frac{d}{dr} V(r)$ - there is the charge proportionality (by work [3]).

Let this theorem be applied within the confines of the atom task, as if for some spherical surface, surrounding a charged kernel in the central forces field of Coulomb's attraction.

So that corresponding function by type the distribution of probability density can be deduced (mean superficial value)

$$\chi \sim \oint_S [\psi]^2 \mathbf{F} \cdot d\mathbf{S} \quad (4)$$

- for which, accordingly, radial dependence by the spherical functions is solved in Eq. (1)

$$\chi(r) = [\psi(r)]^2 = \int_0^\pi d\theta \int_0^{2\pi} [\psi(r, \theta, \phi)]^2 d\phi$$

In context of a narrowly assigned task for the tension surface, is proved nothing more than a position of the repulsion forces, what is not defined for a wave function at infinity.

Perfectly acceptable that such a special case can be fit into the framework of analytic function, where a transformation by the Sokhotsky-Plemelj formulas is known (by work [4])

$$\left. \begin{aligned} \lim_{w \rightarrow z} \varphi_i(w) &= \frac{1}{2\pi i} \int_L \frac{\varphi(\zeta)}{\zeta - z} d\zeta + \frac{1}{2} \varphi(z) \\ \lim_{w \rightarrow z} \varphi_e(w) &= \frac{1}{2\pi i} \int_L \frac{\varphi(\zeta)}{\zeta - z} d\zeta - \frac{1}{2} \varphi(z) \end{aligned} \right\}$$

It is written via the arithmetic mean of the limiting boundary integral values, where Cauchy type integral may give values of analytic functions, inside and outside of integral counter.

The Sokhotsky-Plemelj theorem may be written in compact form of the Kramers-Kronig relations, as on open contour in infinity (by work [5])

$$\phi(w) = \frac{1}{\pi i} \mathcal{P} \int_{-\infty}^{+\infty} \frac{\varphi(w')}{w' - w} dw'$$

For the boundary values of analytic function, there is the identical transformation with a real positive parameter (by work [4])

$$f(x) \equiv \frac{1}{\pi i} \int_0^\infty \frac{f(\zeta)}{\zeta - x} d\zeta$$

These principal limited value of the Cauchy integral are shown in form of the Sokhotski-Plemelj theorem (by work [6] - else [3])

$$i \lim_{\epsilon \rightarrow 0^+} \int_{-\infty}^{+\infty} \frac{f(t)}{t - i\epsilon} dt = -\pi f(0) + i \mathcal{P} \int_{-\infty}^{+\infty} \frac{f(t)}{t} dt$$

In a particular case of exponential function, there is the integral Hankel representation (bypass by a loop, in Figure 3)

$$\frac{1}{\Gamma(1-\alpha)} = \frac{1}{2\pi i} \oint_{-\infty}^{\infty} t^\alpha \frac{\exp(t)}{t} dt$$

Proposition 1 *Supposition about reflected branch of function Let be permissible identical transformation for negative limit as if outside of integral contour*

$$\chi(z) + \chi(-\bar{z}) = \frac{1}{\pi i} \int_{-\infty}^{+\infty} \frac{\chi|t|}{t - z} dt \quad (5a)$$

The given position from base integral expression can be continued

$$X = \frac{1}{2\pi i} \oint_{-\infty}^{\infty} \frac{\chi(t)}{t} dt \quad (5b)$$

In fact, there is possible solving for Eq. (5a) - only from the parametric line on complex plane

$$\begin{cases} z(x) = x + i y(x) \\ \bar{z}(x) = x - i y(x) \end{cases}$$

- where, accordingly, the mapping of real parts is performed

$$\begin{cases} \mathcal{I}(x) \\ \bar{\mathcal{I}}(x) \end{cases} = \operatorname{Re} \left\{ \begin{matrix} \chi(z(x)) \\ \chi(-\bar{z}(x)) \end{matrix} \right\} \quad (6)$$

Proposition 2 *Supposition about weighted characteristic on complex-conjugate plane As far as is argued, there is highlighted solution of the ground state in condition of the wave function (4)*

$$\chi(r) = [\psi(r)]^2 = [Q(r)]^2 \cdot \exp(-r)$$

Then, for specified mapping (6) - the transition states from separated orthogonal system, only on the complex plane, can be formulated

$$\begin{cases} \mathcal{I}(x) \\ \bar{\mathcal{I}}(x) \end{cases} = \operatorname{Re} \left\{ \begin{matrix} \chi(z(x)) \\ \chi(-\bar{z}(x)) \end{matrix} \right\} = \operatorname{Re} \left\{ Q^2(z) \cdot \begin{cases} \exp(-z) \\ \exp(\bar{z}) \end{cases} \right\} \quad (6')$$

When passing through the initial point, then orthogonal system remains always on principal half-plane, where a replacement to opposite sign on complex-conjugate plane is required.

This is, in generally, imagination of steadiness point about the charge singularity, which can be illustrated in Fig. 3.

The functional solving explicitly is shown for Eq. (6')

$$\begin{aligned} \mathcal{I}(x) + \bar{\mathcal{I}}(x) &= (\operatorname{Re} [Q^2(z)] \cdot \cos(y) + \operatorname{Im} [Q^2(z)] \cdot \sin(y)) \cdot (\exp(-x) + \exp(x)) = \\ &= \frac{4}{\pi} xy \int_0^\infty \frac{Q^2(t) \exp(-t) t dt}{t^4 + 2t^2 (y^2 - x^2) + (y^2 + x^2)^2} \end{aligned}$$

- where reflected branch is depicted, provided the initial point $\mathcal{I}(0) + \bar{\mathcal{I}}(0) = 0$ (in Fig. 2).

Fig. 2. The reduced curves of reflected branches in maximum $f(y, x) \sim \bar{\mathcal{I}}(x)$ - where approximate equality for points of maximum is obtained $x(n) \approx \frac{2n-1}{2} \pi$ (by principal numbers). In solution of complex plane $y = y(x)$ - for ground state, nearly straight line along the asymptote runs $y_{(n=1)}(\infty) \rightarrow y_{(n=1)}(0) = \frac{\pi}{2}$ (marked in white)

Fig. 3. Bypass of initial point on complex plane from infinity as in discontinuity point, accordingly for Eq. (5b) - and Eq. (5a).

2.2 Application in law of moment-of-momentum (in extremum)

The aforesaid proposition of the real parts (6) - can be completely resolved in the existence of an extremum

$$\mathcal{I}_i \in \bar{\mathcal{I}}_i \quad (\bar{\mathcal{I}}_i = \bar{\mathcal{I}}(x_i) \rightarrow \max)$$

- where, in point of maximum $x \rightarrow x_i$ - the offset order of principal numbers is designated $i = n - 1 = 0, 1, \dots$.
Let be the extreme position for some spherical system, which normalized at the above basis expression (5b)

$$\left. \begin{matrix} \dot{\mathbf{r}}_i \\ \bar{\mathbf{r}}_i \end{matrix} \right\} \rightarrow \frac{4\pi \mathbf{r}_i}{X_i} \left\{ \begin{matrix} \mathcal{I}_i \\ \bar{\mathcal{I}}_i \end{matrix} \right.$$

Moreover, the proportionality as for offset system of relative radial moment is founded (provided the maximum $\mathcal{M} \in \bar{\mathcal{I}}$):

$$\left\{ \begin{matrix} \mathcal{C}_i = \dot{\mathbf{c}}_i / \mathbf{c}_i = \dot{\mathbf{r}}_i / (2\pi \mathbf{r}_i) \\ \mathcal{M}_i = \dot{\mathbf{m}}_i / \mathbf{m}_i = \mathbf{r}_i / \bar{\mathbf{r}}_i \end{matrix} \right. \quad (7)$$

At rationale of the highlighted ground state, a law on moment of momentum conservation can follow

$$m_i c_i^2 = m_0 c_0^2 \equiv E \quad (i = 0, 1, \dots)$$

- directly under the degenerate electronic value

$$r_i \dot{m}_i \dot{c}_i = r_0 \dot{m}_0 \dot{c}_0$$

Hence the ratio of momentum is derived

$$\frac{m_i}{m_0} = \frac{c_0^2}{c_i^2} = \frac{r_i^2}{r_0^2} = \frac{\mathcal{M}_0 \mathcal{C}_0}{\mathcal{M}_i \mathcal{C}_i} \quad (8)$$

It is corresponding ratio from the above supposition about weighted characteristic

$$\frac{\mathcal{M}_0 \mathcal{C}_0}{\mathcal{M}_i \mathcal{C}_i} = \frac{\mathcal{I}_0}{\bar{\mathcal{I}}_0} \frac{\bar{\mathcal{I}}_i}{\mathcal{I}_i} = \exp^2(x_i - x_0)$$

3 Results and discussion

3.1 Representation about electron-nuclear transitions

In concrete solution of the above system (7) - the highlighted ground state is obtained

$$\mathcal{M}_0 < 1 < \mathcal{M}_i \quad (\mathcal{M} \in \max)$$

- as if for relative *center-of-mass system* (as per Table 1)

$$\mathcal{M}_0 \rightarrow \frac{\mu}{\mu + m} \quad (\mu \gg m)$$

As it turned out, there is a reduced value to the ground state of atom

$$\Delta E_0 = \frac{1}{2} \mathcal{M}_0 \mathcal{C}_0^2 E \rightarrow \mathcal{M}_0 \Delta E \quad (9)$$

- namely, in approximation of the fine-structure constant $\mathcal{C}_0 \rightarrow \mathcal{C}$ (See Designations in Section 1).

It possible that among the transition states, there are the effective levels of kinetic energy by a dissipation type

$$\Delta E_i = \frac{1}{2} \mathcal{M}_i \mathcal{C}_i^2 \mathbf{E} \quad (10)$$

There is possible first level as in accordance with the quantum state

$$\Delta S(n=2) \rightarrow \frac{\Delta E_1}{\Delta E_0} \Delta \mathbf{E}$$

- that may belong of leading line of fine structure $S(n=2)$ - like for the Lamb shift of hydrogen atom (in work [7]). In such case, there is a moment of electron scattering at extremum (Table 1)

$$\frac{S(n=2)}{\Delta S(n=2)} \rightarrow \mathcal{M}_1$$

Table 1. Solution of principal numbers in system $\mathcal{C}_i \in \mathcal{M}_i$ - in extremum $\mathcal{M}_i \in \max$ - according to Eq. (7)

$i = n - 1$	0	1	2	3
$\mathcal{M}_i$	$\approx 1 - 1/207$	10.38	37.40	91.25
$\mathcal{C}_i$	7.297×10^{-3}	1.281×10^{-6}	5.361×10^{-10}	3.163×10^{-13}

Probably, this position like from fine-structure constant, to the Compton Effect of scattering can be referred (by work [3]).

Let for given transition states, the energy nuclear values are supposed

$$K_i = \frac{\mathbf{E}}{\pi \bar{\mathcal{C}}_i} \quad (11)$$

- where a root mean square, from Eq. (10)

$$\bar{\mathcal{C}}_i^2 = \sqrt{\mathcal{M}_i \mathcal{C}_i^2 \cdot \mathcal{M}_0 \mathcal{C}_0^2}$$

As it turned out, there is first transition level in accordance with proton value (as per Table 2).

Presumably, from the above electron moment Eq. (8) - the special energy levels of electromagnetic energy can be characterized

$$T_i = m_i c^2 \quad (12)$$

- where electron value $T_0 = \mathbf{E}$ - at achievable velocity $c_0 = c$ (See Designations in Section 1).

Table 2. Comparative solution from the Eq. (11) - and Eq. (12) (in relative units of proton)

$i = n - 1$	1	2	3
K_i	≈ 1.0	35.48	1169
T_i	0.14889	98.62	68521

As it turned out, there is the first level in accordance to charged π -meson (as per Table 2).

For the purpose of testing, the extended expression has been composed for Eq. (12)

$$\frac{\bar{T}_i^l}{T_i} = \begin{cases} 1 & (l = 0) \\ \sqrt{\frac{T_i^2}{T_i^2 + T_l^2}} & (l \geq 1) \end{cases} \quad (12')$$

- as from projection of orbital numbers $l = 1, 2, \dots, (n-1)$ - in shifted system of principal numbers $i = n-1$. There is possible a general order of the quantized charge $n-l-1 = 0, 1, \dots$ - both for the charged and neutral states. Together with the π -mesons, the family of intermediate bosons can be identified, where a sequence to the spin momentum of particle occurs (as per Table 3).

Table 3. Regular series from out Eq. (12') (diagonally)

$(n-1) \backslash l$	0	1	2
0	E	π^0	Z^0
1	$\pi^\pm$	$W^\pm$	
2	?		

- under comparison with experimental data (in electron units)

$n-1$	l	$\frac{1}{2}T_{n-1}^l$	experiment
1	0	273.38	273.13
	1	264.82	264.13
2	0	181081	—
	1	160886	158000
	2	180811	187000

3.2 Quasi-orbital correction

In the above description, however, some amendment on electronic self-perturbation for wave equation should be taken into account (by a relativistic type).

Let the identical variants of equation (1) - both for the electronic value and potential value, are transformed

$$-E \mathbf{r}^2 \nabla^2 \psi + V \psi = \check{E} \psi \quad (1a)$$

$$-E \mathbf{r}^2 \nabla^2 \psi + \check{V} \psi = E \psi \quad (1b)$$

- where radial variable replacement from Eq. (2).

These variants can be appropriately rewritten at relative λ -parameter

$$\frac{d^2 \psi}{dt^2} + \frac{2}{t} \frac{d\psi}{dt} + \left[-\frac{1}{4} \frac{\check{E}}{E} + \frac{n}{t} - \frac{\lambda(\lambda+1)}{t^2} \right] \psi = 0$$

$$\frac{d^2 \psi}{dt^2} + \frac{2}{t} \frac{d\psi}{dt} + \left[-\frac{1}{4} + \frac{n}{t} \sqrt{\frac{E}{\check{E}}} - \frac{\lambda(\lambda+1)}{t^2} \right] \psi = 0$$

- where perturbed electronic value is redefined (in order of principal numbers $n = \imath + 1 = 1, 2, \dots$)

$$\frac{\check{E}}{E} = \left[\frac{n}{n+\lambda} \right]^2, \quad \lambda = n \left[\sqrt{\frac{E}{\check{E}}} - 1 \right]$$

So that an electronic perturbation is based under the above increment of energy (See Designations in Section 1)

$$\check{E} = E + \kappa^2 \Delta E \quad (13)$$

Wherein a small variation of electronic value is realized, for which corresponding relative charge coefficient given (some charge-factor).

As it turned out, there is a fractional charge-factor $\kappa = \pm \frac{1}{3}$ - where, for the highlighted ground state, the experimental matching with muonium atom can be obtained (as per Table 4).

More accurate approximation, however, for potential variation is solved in Eq. (1b) - than in Eq. (1a).

There, a dissimilarity in the solutions may indicate for incomplete task (within the sixth sign of relative error).

The stable proton may have a complex structure with twice-charged kernel as if in electron "shell" by Eq. (2). $n = 2$ - unlike the unstable muon kernel $n = 1$

Supposedly, the charge-factor shall be continued in the transition states by Eq. (13) - where correlation can be equally improved from out a quantized dependence $\kappa_\imath = \kappa(n-1)$

For the concrete small variation $\kappa_1 \rightarrow 1.05/3$ (as per Table 5).

In correspondence of the hydrogen atom, there is electron value as a difference between the correlated and uncorrelated solutions $K_1 - \check{K}_1 \rightarrow E$

It should be noted that in the proton state, a small energy shift occurs as if within the limits of an electronic neutrino

$$\check{E}_1 - \check{E}_0 = [\kappa_1^2 - \kappa_0^2] \Delta E \approx 0.15 \text{ eV}$$

(here accordingly $\Delta E = 13.6 \text{ eV}$ - in Section 1).

Table 4. Solution of ground state from Eq. (9) - at comparison with experimental data of muonium atom, where relative expression of the center-of-mass system according to muon mass $\mu_0 = \frac{\mathcal{M}_0}{1-\mathcal{M}_0} \rightarrow m_\mu$ - and fine-structure constant $\mathcal{C}_0 \rightarrow \alpha$ (relative error)

$\mathcal{M}_0 - \frac{m_\mu}{m_\mu + m_e}$	$\frac{\mu_0 - m_\mu}{m_\mu}$	$\frac{\mathcal{C}_0 - \alpha}{\alpha}$	(variant)
-8.5×10^{-6}	1.8×10^{-3}	-4.9×10^{-5}	(1)
-1.0×10^{-8}	2.1×10^{-6}	5.1×10^{-6}	(1a)
-1.0×10^{-8}	2.1×10^{-6}	7.3×10^{-7}	(1b)

Table 5. Solution of transition state from the Eq. (12), Eq. (11) and Eq. (10) - in comparison with experimental data for charged π -meson, proton, also for the Lamb shift (relative error)

κ	0	$\frac{1}{3}$	$\frac{1.05}{3}$
$\frac{T_1 - 2m_\pi c^2}{2m_\pi c^2}$	9.0×10^{-4}	1.1×10^{-4}	3.0×10^{-5}
$\frac{K_1 - m_p c^2}{m_p c^2}$	5.2×10^{-4}	7.0×10^{-5}	2.6×10^{-5}
$1 - \frac{\Delta E_1}{\Delta E_0} \frac{\Delta E}{\Delta S(n=2)}$	2×10^{-3}	2×10^{-4}	1×10^{-5}

Perhaps, indicated position with a fractional electric charge may be in agreement with the existing Quark Model of nucleus (in Fig. 4).

Fig. 4. Modeling for planar "electron" that is inscribed into atomic sphere, where elementary charge on three parts is disintegrated (at bound charge-pair). This can be from an obvious property of the geometric plane which drawn only through three points.

4 Conclusion

The above task has been described exclusively within the framework of electric interaction where a problem of proton nucleus can be solved in accordance with the Lamb shift.

It is likely that a given position can serve the purpose of some alternative to the quantum electrodynamics, where does not need to be specially entered the electroweak interaction.

In this case, it would be interesting to know what is the meaning of a multiply charged states, for which obtained unexpected condition of "cores" $K_i < T_i$ - as in the only state of a stable proton $K_1 > T_1$ (by Table 2).

Here a proposal was put forward about the universality of a high-energy nuclear reaction, where some hypothetical center of scattering can be characterized (as per Table 6).

Table 6. Threshold energy levels from Table 2 (in units GeV)

$i = n - 1$	1	2	3
$H_i = K_i + T_i$	≈ 1.078	125.8	65370

As it turned out, there is energy level in accordance with the experimental Higgs boson $H_2 \sim 125.8 \text{ GeV}$ (in the account of proton units).

In a certain confirmation may be noted the experiment by production of the intermediate bosons, with decay to quark pair [8].

The distinct anomaly of events under transient "core" can be demonstrated here $K_2 \sim 33,3 \text{ GeV}$ (it is marked in red in Fig. 5).

There, resulting double value of electromagnetic energy is observed $2 K_2 \rightarrow (15 + 52) = 67 \text{ GeV}$

Apparently, this effect tends to persist in subsequent experiments [9].

Fig. 5. The ratio of the W + c-jet to W + b-jet production cross sections for data (FIG.8 by work [8]).

As well result of restored event with two b-jets, in experiment DZero at the Tevatron collider with the D0 detector (taken with the site: www.fnal.gov).

Perhaps the similar Higgs effect may meet as the most common at the nuclear reactions.

For example, a badly interpretable measurement for the photoabsorption of actinides nuclei in region of Δ -resonance is detected, where a total cross-section far from the so-called "universal curve" (by work [10]).

The critical nucleon number of the compound atomic nucleus is expected $K_2/K_1 \approx 238$ - as if exchange with resonant ensemble of virtual mesons $K_1 \rightarrow \pi^\pm$ - in the intranuclear scattering.

In this peculiarity, there is a last stable stage of the Uranium isotope, where the subsequent atomic number would be extremely large (by Table 6).

It is quite possible, the high-energy states can develop in the interiors of stars, where a formation of real atoms would be not so much in the nuclear fusion as in a fission reaction from higher levels.

The fact is evident that observed (thermonuclear) reaction of nuclear fusion, always occurs as avalanche due to excessive presence of actinides (that would be perhaps ineffective for purely light atoms).

It may turn out, at accumulation of a sufficient quantity of heavy atoms, there is an avalanche reaction as in observation of the supernova explosions.

Declarations

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