Theoretical method for determining precise values of the dimensionless fundamental physical constants

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In this article the author presents an original theoretical method of determining accurate values of the dimensionless fundamental physical constants: fine structure constant, of constant of the strong interaction, the anomaly of the magnetic moment of the electron, the mass ratio of the electron and proton, the mass ratio of the electron and the neutron. Presents the final results of analytical calculations determining the of exact values of these constants.

Keywords: the fine-structure constant, the constant of the strong interaction, the anomaly of the magnetic moment of the electron, the mass ratio of the electron and proton, the ratio of the masses of the electron and of the neutron

If the parameter has a subscript « π », it this means that this theoretical parameter has a numerical value that can be used instead of the true parameter value.

1. The basic relationships

Let us write the expression

$$k_{\pi 0}^{n-1} \cdot \lambda_{\pi} \cdot (1 \pm \vartriangle y_{\pi} \cdot \alpha_{\pi})^{n} = (\sqrt{2} \cdot \pi)^{n} \cdot \lambda_{\pi 0}^{n}, \tag{1.1}$$

where

$$k_{\pi 0} = \lambda_{\pi} \cdot \alpha_{\pi} \cdot \beta_{\pi};\ \lambda_{\pi 0}^{n} = \pi^{n-1} \cdot k_{\pi 0}^{n}; \tag{1.2}$$

α_{π}, β_{π}, $\vartriangle y_{\pi}$ – numeric parameters; λ_{π}, $k_{\pi 0}$, $\lambda_{\pi 0}$ – the parameters with dimension of length; $n = 1, 2, 3, \dots$ – integer from natural number.

It is known [1, p. 37] algebraic equation with an unknown x degree n type:

$$f(x) \equiv a_0 \cdot x^n + a_1 \cdot x^{n-1} + \dots + a_{n-1} \cdot x + a_n = 0 \qquad (a_0 \neq 0). \tag{1.3}$$

Here n – non-negative integer, a_0, $a_1, \cdots$, a_n – is a real numbers, $f(x)$ – the polynomial [2, p. 7] extent n on one variable x:

$$f(x) = (1+x)^n = 1 + n \cdot x + \frac{n \cdot (n-1)}{2!} \cdot x^2 + \frac{n \cdot (n-1) \cdot (n-2)}{3!} \cdot x^3 + \dots + \frac{n!}{(n-r)! \cdot r!} \cdot x^r + \dots. \tag{1.4}$$

$$f(x) = (1-x)^n = 1 - n \cdot x + \frac{n \cdot (n-1)}{2!} \cdot x^2 - \frac{n \cdot (n-1) \cdot (n-2)}{3!} \cdot x^3 + \dots + (-1)^r \cdot \frac{n!}{(n-r)! r!} \cdot x^r + \dots \tag{1.5}$$

If n – positive integer, the expressions (1.4) and (1.5) consists of a *finite* number of members.

The algebraic equation of the form (1.3) is called valid if all its coefficients a_i – are real numbers. It is known [1, p. 39] that the corresponding equation (1.3) is a valid polynomial $f(x)$ of the form (1.4) and (1.5) for all valid values x can take values. In the article are only valid algebraic equation of the form (1.3).

We write (1.1) in the form

$$\frac{(1 \pm \vartriangle y_{\pi} \cdot \alpha_{\pi})^{n}}{(\sqrt{2} \cdot \pi)^{n}} \cdot k_{\pi 0}^{n-1} \cdot \lambda_{\pi} = \lambda_{\pi 0}^{n}. \tag{1.6}$$

We denote the left part of equation (1.6) as

$$\lambda_{\pi S}^{n-1} = \frac{(1 \pm \vartriangle y_{\pi} \cdot \alpha_{\pi})^{n}}{(\sqrt{2} \cdot \pi)^{n}} \cdot k_{\pi 0}^{n-1}, \tag{1.7}$$

then (1.6) can be written:

$$\lambda_{\pi S}^{n-1} \cdot \lambda_{\pi} = \lambda_{\pi 0}^{n}. \tag{1.8}$$

Taking into account (1.2), the expression (1.7) can be written as

$$\lambda_{\pi S}^{n-1} = \frac{(1 \pm \vartriangle y_{\pi} \cdot \alpha_{\pi})^{n} \cdot (\alpha_{\pi} \cdot \beta_{\pi})^{n-1}}{(\sqrt{2} \cdot \pi)^{n}} \cdot \lambda_{\pi}^{n-1}. \tag{1.9}$$

At the same time, taking into account (1.2) and (1.8) can be written in the form

$$\lambda_{\pi S}^{n-1} = \pi^{n-1} \cdot (\alpha_\pi \cdot \beta_\pi)^n \cdot \lambda_\pi^{n-1}. \tag{1.10}$$

Equating (1.9) and (1.10), we obtain:

$$(\sqrt{2} \cdot \pi)^n \cdot \pi^{n-1} \cdot \alpha_\pi \cdot \beta_\pi = (1 \pm \vartriangle y_\pi \cdot \alpha_\pi)^n. \tag{1.11}$$

It is known [1, p. 38] that a general formula expressing the roots of algebraic equations through the coefficients and containing only a *finit*e *number* of operations, additions and subtractions, multiplications, divisions and root extractions only exist for equations of degree $n \le 4$. With this in mind, we write the equation (1.1) for the case $n = 3$ in the form:

$$k_{\pi 0}^2 \cdot \lambda_\pi \cdot (1 \pm \vartriangle y_\pi \cdot \alpha_\pi)^3 = (\sqrt{2} \cdot \pi)^3 \cdot \lambda_{\pi 0}^3, \tag{1.12}$$

then $\lambda_{\pi 0}^n$ from (1.2) can be written as

$$\lambda_{\pi 0}^3 = \pi^2 \cdot k_{\pi 0}^3, \tag{1.13}$$

and (1.6) as

$$\frac{(1 \pm \vartriangle y_\pi \cdot \alpha_\pi)^3}{(\sqrt{2} \cdot \pi)^3} \cdot k_{\pi 0}^2 \cdot \lambda_\pi = \lambda_{\pi 0}^3. \tag{1.14}$$

Designating the area s_π as

$$s_\pi = \frac{(1 \pm \vartriangle y_\pi \cdot \alpha_\pi)^3}{(\sqrt{2} \cdot \pi)^3} \cdot k_{\pi 0}^2, \tag{1.15}$$

we write (1.14), taking into account (1.15), as

$$s_\pi \cdot \lambda_\pi = \lambda_{\pi 0}^3. \tag{1.16}$$

Taking into account (1.2), (1.15) can be written as

$$s_\pi = \frac{(1 \pm \vartriangle y_\pi \cdot \alpha_\pi)^3 \cdot (\alpha_\pi \cdot \beta_\pi)^2}{(\sqrt{2} \cdot \pi)^3} \cdot \lambda_\pi^2. \tag{1.17}$$

At the same time, taking into account (1.2), (1.13) and (1.16), the area s_π can be written as

$$s_\pi = \pi^2 \cdot (\alpha_\pi \cdot \beta_\pi)^3 \cdot \lambda_\pi^2. \tag{1.18}$$

Let us denote in (1.18) elementary scalar radius $r_{\pi s}$ as

$$r_{\pi s} = \alpha_\pi \cdot \beta_\pi. \tag{1.19}$$

Scalar the length of a circle $l_{\pi s}$, given (1.19), equal

$$l_{\pi s} = 2 \cdot \pi \cdot \alpha_\pi \cdot \beta_\pi \tag{1.20}$$

and the scalar square $s_{\pi s}$ is equal to

$$s_{\pi s} = 4 \cdot \pi^2 \cdot r_{\pi s}^2, \tag{1.21}$$

and volume $v_{\pi s}$ is equal to scalar

$$v_{\pi s} = \pi^2 \cdot r_{\pi s}^3. \tag{1.22}$$

Equating (1.17) and (1.18), we obtain the equation:

$$(\sqrt{2} \cdot \pi)^3 \cdot \pi^2 \cdot \alpha_\pi \cdot \beta_\pi = (1 \pm \vartriangle y_\pi \cdot \alpha_\pi)^3. \tag{1.23}$$

2. Protoparameters

2.1. Scalar parameter of structure of space-time

We write the equation (1.23) in the form

$$(\sqrt{2} \cdot \pi)^3 \cdot \pi^2 \cdot \alpha_{\pi 0} \cdot \overline{\beta}_\pi = (1 + \vartriangle y_\pi \cdot \alpha_\pi)^3, \tag{2.1.1}$$

where

$$\overline{\beta}_\pi = 1 + \overline{\beta}_{\pi 0}; \tag{2.1.2}$$

$$\vartriangle y_{\pi 0} = \sqrt[4]{2 \cdot \pi} ; \tag{2.1.3}$$

$$\varphi_{\pi 0} = \frac{\alpha_{\pi 0}}{\overline{\beta}_{\pi 0}}, \ (\varphi_{\pi 0} = \sqrt{2} \cdot \pi). \tag{2.1.4}$$

The right part of (2.1.1) is a polynomial (1.4) for the case of $n = 3$ [2, p. 8]:

$$(1+x)^3 = 1+3 \cdot x + 3 \cdot x^2 + x^3 . \tag{2.1.5}$$

Denoting $x = \vartriangle y_{\pi 0} \cdot \alpha_{\pi 0}$, we write (2.1.5) in the form

$$(1+\vartriangle y_{\pi 0} \cdot \alpha_{\pi 0})^3 = 1+3 \cdot \vartriangle y_{\pi 0} \cdot \alpha_{\pi 0} + 3 \cdot \vartriangle y_{\pi 0}^2 \cdot \alpha_{\pi 0}^2 + \vartriangle y_{\pi 0}^3 \cdot \alpha_{\pi 0}^3 . \tag{2.1.6}$$

Equation (2.1.5) is written in general form as [3, p. 304]:

$$a \cdot x^3 + b \cdot x^2 + c \cdot x + d = 0 \qquad (a \neq 0). \tag{2.1.7}$$

Using any of the known methods for solving cubic equations (for example, the solution of Cardano [1, p. 43] or search procedure – for example, a method of half division [3, p. 472]) yields the parameter $\alpha_{\pi 0}$ – is the real root of the equation (2.1.1).

We write the equation (1.23) in the form:

$$(\sqrt{2} \cdot \pi)^3 \cdot \pi^2 \cdot \alpha_{\pi e} \cdot \beta_{\pi e} = (1 - \vartriangle y_{\pi e} \cdot \alpha_{\pi e})^3 , \tag{2.1.8}$$

in which the parameter $\beta_{\pi e}$

$$\beta_{\pi e} = 1 + \frac{\overline{\beta}_{\pi 0}}{\overline{\beta}_{\pi}^3} . \tag{2.1.9}$$

Right hand side of (2.1.8) is a polynomial (1.5) for the case of $n = 3$ [2, p. 8]:

$$(1-x)^3 = 1-3 \cdot x - 3 \cdot x^2 - x^3 . \tag{2.1.10}$$

Denoting $x = \vartriangle y_{\pi e} \cdot \alpha_{\pi e}$, we write (2.1.10) in the form

$$(1-\vartriangle y_{\pi e} \cdot \alpha_{\pi e})^3 = 1-3 \cdot \vartriangle y_{\pi e} \cdot \alpha_{\pi e} - 3 \cdot \vartriangle y_{\pi e}^2 \cdot \alpha_{\pi e 0}^2 - \vartriangle y_{\pi e}^3 \cdot \alpha_{\pi e}^3 . \tag{2.1.11}$$

For finding the coefficient $\vartriangle y_{\pi e}$ in (2.1.11) we write the quadratic equation

$$\frac{1}{\varphi_{\pi 0}} \cdot \alpha_{\pi x}^2 + \alpha_{\pi x} - \overline{\beta}_{\pi} = 0 . \tag{2.1.12}$$

As is known [1, p. 43], an algebraic equation of the 2nd degree is written in the form:

$$a \cdot x^2 + b \cdot x + c = 0 \qquad (a \neq 0). \tag{2.1.13}$$

The roots of the equation are determined by the formula:

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4 \cdot a \cdot c}}{2 \cdot a} . \tag{2.1.14}$$

Note, that

$$x_1 + x_2 = -\frac{b}{a} \ \text{и} \ x_1 \cdot x_2 = \frac{c}{a} . \tag{2.1.15}$$

The ratio of the roots of equation (2.1.12) we write as:

$$\Delta_{\pi x} = \frac{\alpha_{\pi x 2}}{\alpha_{\pi x 1}} . \tag{2.1.16}$$

Find $\vartriangle y_{\pi e}$ out how

$$\vartriangle y_{\pi e} = \frac{\Delta_{\pi x}}{\vartriangle y_{\pi 0}^3} . \tag{2.1.17}$$

Using any of the known methods of solving cubic equations, or a search procedure, we find the parameter $\alpha_{\pi e}$ – is the real root of the equation (2.1.8).

To determine the scalar parameter of structure of space-time $\mathrm{f}_{\pi s}$ we write the ratio:

$$\frac{\alpha_{\pi 0}\cdot\bar{\beta}_{\pi}}{\alpha_{\pi e}\cdot\beta_{\pi e}}=\frac{(\alpha_{\pi e}\cdot\beta_{\pi e})^3}{(\alpha_{\pi}\cdot\beta_{\pi})^3}. \tag{2.1.18}$$

Write (2.1.18) in the form

$$(\alpha_{\pi}\cdot\beta_{\pi})^3=\frac{\alpha_{\pi e}^4\cdot\beta_{\pi e}^4}{\alpha_{\pi 0}\cdot\bar{\beta}_{\pi}}. \tag{2.1.19}$$

From (2.1.19):

$$\alpha_{\pi}\cdot\beta_{\pi}=\sqrt[3]{\frac{(\alpha_{\pi e}\cdot\beta_{\pi e})^4}{\alpha_{\pi 0}\cdot\bar{\beta}_{\pi}}}. \tag{2.1.20}$$

Scalar parameter of structure of space-time $\mathrm{f}_{\pi s}$:

$$\mathrm{f}_{\pi s}=\alpha_{\pi}\cdot\beta_{\pi}. \tag{2.1.21}$$

2.2. Electromagnetic constant

To determine the electromagnetic constant α_{π} let us write the expression:

$$\frac{[\alpha\cdot\beta]_{\pi}}{\alpha_{\pi 0}\cdot\bar{\beta}_{\pi}}=\frac{(\alpha_{\pi e}\cdot\beta_{\pi e})^3}{[\alpha\cdot\beta]_{\pi}^3} \tag{2.2.1}$$

Let us write the expression (2.2.1) in the form

$$[\alpha\cdot\beta]_{\pi}^4=(\alpha_{\pi e}\cdot\beta_{\pi e})^3\cdot\alpha_{\pi 0}\cdot\bar{\beta}_{\pi}. \tag{2.2.2}$$

From (2.2.2):

$$[\alpha\cdot\beta]_{\pi}=\sqrt[4]{(\alpha_{\pi e}\cdot\beta_{\pi e})^3\cdot\alpha_{\pi 0}\cdot\bar{\beta}_{\pi}}. \tag{2.2.3}$$

We denote the relation (2.2.3) to (2.1.20) as

$$\mathrm{k}_{\pi}^4=\frac{[\alpha\cdot\beta]_{\pi}}{\alpha_{\pi}\cdot\beta_{\pi}}. \tag{2.2.4}$$

The ratio k_{π} of (2.2.4):

$$\mathrm{k}_{\pi}=\sqrt[4]{\frac{[\alpha\cdot\beta]_{\pi}}{\alpha_{\pi}\cdot\beta_{\pi}}}. \tag{2.2.5}$$

The electromagnetic constant α_{π} is defined as

$$\alpha_{\pi}=\frac{\alpha_{\pi e}}{\mathrm{k}_{\pi}}. \tag{2.2.6}$$

The constant of parametric communication β_{π}:

$$\beta_{\pi}=\frac{\mathrm{f}_{\pi s}}{\alpha_{\pi}}. \tag{2.2.7}$$

Taking into account (2.2.6), the fine-structure constant $\alpha_{\pi th}$ can be written as

$$\alpha_{\pi th}=2\cdot\pi\cdot\alpha_{\pi}. \tag{2.2.8}$$

3. The anomaly of the magnetic moment of the electron

We write obvious equation:

$$a-b=a-b. \tag{3.1}$$

We write (3.1) in the form:

$$a-b=\frac{a}{k_1}-\frac{b}{k_2}. \tag{3.2}$$

We denote

$$a=\alpha_{\pi e};\ b=a_{\pi ex};\ k_1=\mathrm{k}_{\pi};\ k_2=k_{\pi x}. \tag{3.3}$$

We write (3.2), taking into account (3.3), in the form:

$$\alpha_{\pi e} - a_{\pi ex} = \frac{\alpha_{\pi e}}{\mathrm{k}_{\pi}} - \frac{a_{\pi ex}}{k_{\pi x}}. \tag{3.4}$$

We denote the anomaly of the magnetic moment of the electron $a_{\pi \mathrm{e}}$:

$$a_{\pi \mathrm{e}} = \frac{a_{\pi ex}}{k_{\pi x}}. \tag{3.5}$$

Taking into account (3.3) and (3.5), we write (3.4) in the form

$$\alpha_{\pi e} - a_{\pi ex} = \alpha_{\pi} - a_{\pi \mathrm{e}}. \tag{3.6}$$

Denoting in (3.6) of the electromagnetic constant asymmetry $\Delta_{\pi a}$

$$\Delta_{\pi a} = \alpha_{\pi e} - a_{\pi ex}, \tag{3.7}$$

from (3.6) we define $a_{\pi \mathrm{e}}$:

$$a_{\pi \mathrm{e}} = \alpha_{\pi} - \Delta_{\pi a}. \tag{3.8}$$

To determine $\Delta_{\pi a}$ find $a_{\pi ex}$ from the equation

$$(1 - \vartriangle y_{\pi e} \cdot \alpha_{\pi e})^3 = k_{\pi q}^4 \cdot (1 - \vartriangle y_{\pi e} \cdot a_{\pi ex})^3, \tag{3.9}$$

where the coefficient $k_{\pi q}$ of the charge asymmetry:

$$k_{\pi q} = \frac{\alpha_{\pi x}}{\alpha_{\pi y}}. \tag{3.10}$$

Options $\alpha_{\pi x} < 1$ and $\alpha_{\pi y} < 1$ – real roots of a cubic equation of the form (1.23):

$$(\sqrt{2} \cdot \pi)^3 \cdot \pi^2 \cdot \alpha_{\pi x} \cdot \overline{\beta}_{\pi} = (1 - \vartriangle y_{\pi 0} \cdot \alpha_{\pi x})^3; \tag{3.11}$$

$$(\sqrt{2} \cdot \pi)^3 \cdot \pi^2 \cdot \alpha_{\pi y} \cdot \beta_{\pi e} = (1 + \vartriangle y_{\pi e} \cdot \alpha_{\pi y})^3. \tag{3.12}$$

4. Two-particle state

We write the ratio:

$$\lambda_{\pi x} \cdot \lambda_{\pi y} \cdot \lambda_{\pi 0} = (\sqrt{2} \cdot \pi)^3 \cdot \lambda_{\pi 0}^3 \cdot \gamma_{\pi}. \tag{4.1}$$

We write the equation (1.12) in the form

$$k_{\pi 0}^2 \cdot \lambda_{\pi x} \cdot \left(1 + \vartriangle y_{\pi} \cdot \alpha_{\pi}\right)^3 = (\sqrt{2} \cdot \pi)^3 \cdot \lambda_{\pi 0}^3 \tag{4.2}$$

where:

$$k_{\pi 0} = \lambda_{\pi x} \cdot \alpha_{\pi} \cdot \beta_{\pi}, \tag{4.3}$$

$$\lambda_{\pi 0} = \sqrt[3]{\pi^2} \cdot k_{\pi 0}. \tag{4.4}$$

We divide (4.1) on (4.2), obtain:

$$\frac{\lambda_{\pi y} \cdot \lambda_{\pi 0}}{k_{\pi 0}^2 \cdot (1 + \vartriangle y_{\pi} \cdot \alpha_{\pi})^3} = \gamma_{\pi}. \tag{4.5}$$

Taking into account (4.3) and (4.4), we write (4.5) as:

$$\frac{\lambda_{\pi y}}{\lambda_{\pi x}} = \frac{\alpha_{\pi} \cdot \beta_{\pi} \cdot (1 + \vartriangle y_{\pi} \cdot \alpha_{\pi})^3}{\sqrt[3]{\pi^2}} \cdot \gamma_{\pi}. \tag{4.6}$$

Denoting

$$\theta_{\pi} = \frac{\lambda_{\pi y}}{\lambda_{\pi x}}, \tag{4.7}$$

we write (4.6) as

$$\theta_{\pi} = \frac{\alpha_{\pi} \cdot \beta_{\pi} \cdot (1 + \vartriangle y_{\pi} \cdot \alpha_{\pi})^3}{\sqrt[3]{\pi^2}} \cdot \gamma_{\pi}. \tag{4.8}$$

1. The state of electron-proton.

In this case, the coefficient γ_π can be written in the form:

$$\gamma_{\pi\text{p}} = \left(1 - \frac{\alpha_\pi}{\alpha_{\pi s}}\right) \cdot k_{\pi st}\,, \tag{4.9}$$

where:

$\alpha_{\pi s}$ – constant of the strong interaction;

$k_{\pi st}$ – the coefficient of absolute stability.

We write (4.8), taking into account (4.9), in the form:

$$r_{\pi\text{ep}} = \frac{\alpha_\pi \cdot \beta_\pi \cdot (1 + \vartriangle y_\pi \cdot \alpha_\pi)^3}{\sqrt[3]{\pi^2}} \cdot \left(1 - \frac{\alpha_\pi}{\alpha_{\pi s}}\right) \cdot k_{\pi st}\,. \tag{4.10}$$

Note that always $r_{\pi\text{ep}} > 0$, i.e. the ratio of the masses cannot be negative.

Find $\alpha_{\pi s}$.

Option $\vartriangle y_\pi$ find from equation (1.23), which is written in the form:

$$(\sqrt{2} \cdot \pi)^3 \cdot \pi^2 \cdot \text{f}_{\pi s} = (1 + \vartriangle y_\pi \cdot \alpha_\pi)^3\,. \tag{4.11}$$

We write (1.23) in the form:

$$(\sqrt{2} \cdot \pi)^3 \cdot \pi^2 \cdot \alpha_{\pi z} \cdot \beta_\pi = (1 + \vartriangle y_\pi \cdot \alpha_{\pi z})^3. \tag{4.12}$$

After solving the equation (4.12), we find three valid values for root $\alpha_{\pi z}$: α_π, $\alpha_{\pi s1}$ and $\alpha_{\pi 2}$.

Taking into account (2.1.21), equation (4.10) for the ratio of the masses of the electron and proton $r_{\pi\text{ep}}$ can be written as

$$r_{\pi\text{ep}} = \frac{\text{f}_{\pi s} \cdot (1 + \vartriangle y_\pi \cdot \alpha_\pi)^3}{\sqrt[3]{\pi^2}} \cdot \left(1 - \frac{\alpha_\pi}{\alpha_{\pi s}}\right) \cdot k_{\pi st}\,. \tag{4.13}$$

We define the coefficient from the condition of equality

$$\left(\frac{\beta_{\pi e}}{\beta_\pi}\right)^7 = \left(\frac{\alpha_{\pi e}}{\alpha_\pi}\right)^9 \tag{4.14}$$

as

$$k_{\pi st} = \left(\frac{\beta_{\pi e}}{\beta_\pi}\right)^7 = \left(\frac{\alpha_{\pi e}}{\alpha_\pi}\right)^9. \tag{4.15}$$

Note that if the values of parameters $\alpha_{\pi e}$ and $\beta_{\pi e}$ in (4.14) are fixed, then the values α_π and β_π are a unique set of parameters in accordance with the system of equations:

$$\begin{cases} \alpha_\pi \cdot \beta_\pi = const \\ \left(\dfrac{\beta_{\pi e}}{\beta_\pi}\right)^7 = \left(\dfrac{\alpha_{\pi e}}{\alpha_\pi}\right)^9 \end{cases} \tag{4.16}$$

From (4.16) it follows that, at constant values of the parameters $\alpha_{\pi e}$ and $\beta_{\pi e}$ change the parameters α_π and β_π are impossible in principle.

Keeping in mind, that

$$k_{\pi st} = \text{k}_\pi^9\,, \tag{4.17}$$

we write, taking into account (4.15) and (4.17), k_π in the form

$$\text{k}_\pi^9 = \left(\frac{\beta_{\pi e}}{\beta_\pi}\right)^7. \tag{4.18}$$

From (4.18)

$$\mathrm{k}_\pi^{9/7} = \frac{\beta_{\pi e}}{\beta_\pi}. \tag{4.19}$$

The exponent k_π in equation (4.19) is an the infinite periodic number sequence:

$$\frac{9}{7} = 1{,}285714\ \ 285714\ \ldots\ 285714\ \ldots \tag{4.20}$$

In the General case, (4.19) can be written as

$$\mathrm{k}_\pi^{m/7} = \frac{\beta_{\pi e}}{\beta_\pi}, \tag{4.21}$$

where *m* is the number of natural number.

Note that for any m the sum of 6 terms of the sequence of the form (4.20) is always equal to 27.

From the above it follows that in view of the availability in equation (4.13) of the coefficient, system electron-proton the is stable.

2. The state of the electron-neutron.

In this case, the coefficient γ_π can be written in the form:

$$\gamma_{\pi \mathrm{n}} = \frac{a_{\pi \mathrm{e}} + a_{\pi w}}{a_{\pi \mathrm{e}} + \Delta_{\pi a}}, \tag{4.22}$$

where:

anomaly symmetry $a_{\pi w}$:

$$a_{\pi w} = k_{\pi w}^3 - 1; \tag{4.23}$$

the coefficient weak of asymmetry $k_{\pi w}$:

$$k_{\pi w} = \mathrm{k}_\pi \cdot \left(\frac{1 + \alpha_{\pi e} \cdot \beta_{\pi e}}{1 + \mathrm{f}_{\pi s}} \right)^2 \cdot \left[1 + \left(-\frac{(\pi - 1)^2}{\pi} \right)^4 \cdot \frac{4}{\varphi_{\pi 0}} \cdot \mathrm{f}_{\pi s}^4 \right]. \tag{4.24}$$

We write the ratio of the masses of the electron and of the neutron $r_{\pi \mathrm{en}}$ in the form:

$$r_{\pi \mathrm{en}} = \left[\frac{\mathrm{f}_{\pi s} \cdot (1 + \vartriangle y_\pi \cdot \alpha_\pi)^3}{\sqrt[3]{\pi^2}} \right] \cdot \left(\frac{a_{\pi \mathrm{e}} + a_{\pi w}}{a_{\pi \mathrm{e}} + \Delta_{\pi a}} \right). \tag{4.25}$$

In the absence of in equation (4.25) of the coefficient $k_{\pi st}$, system electron-neutron the is unstable.

2. The state of the neutron-proton.

We write the ratio of the masses of the neutron and proton as the ratio of (4.13) to (4.25):

$$r_{\pi \mathrm{np}} = \left(1 - \frac{\alpha_\pi}{\alpha_{\pi s}} \right) \cdot \left(\frac{a_{\pi \mathrm{e}} + \Delta_{\pi a}}{a_{\pi \mathrm{e}} + a_{\pi w}} \right) \cdot k_{\pi st}. \tag{4.26}$$

In view of the availability in equation (4.26) of the coefficient $k_{\pi st}$, system neutron-proton the is stable.

The **Table** presents the results of theoretical calculations of the fundamental physical constants (italics proto-constants).

Table

The name of the parameter	Symbol	The numerical value
scalar parameter of structure of space-time	$\mathrm{f}_{\pi s}$	$1.161\ 712\ 977\ 019\ 596\ 928\ 9703 \cdot 10^{-3}$
electromagnetic constant	α_π	$1.161\ 409\ 733\ 400\ 893\ 939\ 4882 \cdot 10^{-3}$
fine-structure constant	$\alpha_{\pi th}$	$7.297\ 352\ 572\ 519\ 857\ 423\ 5458 \cdot 10^{-3}$

The name of the parameter	Symbol	The numerical value
the anomaly of the magnetic moment of the electron	$a_{\pi e}$	$1.159\,652\,180\,787\,571\,998\,6230 \cdot 10^{-3}$
the ratio of the masses of the electron and proton	$r_{\pi \mathrm{ep}}$	$5.446\,170\,218\,699\,090\,667\,4031 \cdot 10^{-4}$
the ratio of the masses of the electron and neutron	$r_{\pi \mathrm{en}}$	$5.438\,673\,445\,786\,830\,889\,6626 \cdot 10^{-4}$
the first constant of the strong interaction	$\alpha_{\pi s1}$	-15.711 152 080 759 781 419 544
a second constant of the strong interaction	$\alpha_{\pi s2}$	13.814 879 104 540 821 943 269

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