Pi-Theory: analytical method of determining the values of fundamental physical constants

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Abstract: the article presents the author developed an original analytical method for determining the values of the fundamental physical constants (FPC). Given a finite formulas and the exact results of theoretical calculations 27 constants, including the fine-structure constant, the electron mass, Newton's gravitational constant, the Boltzmann constant and the molar gas constant. Presents a table comparing the results of calculations with the data CODATA 2010.

Keywords: anomaly of the magnetic moment, electron, muon, Planck length, Boltzmann constant

1. Introduction

Pi-Theory of the fundamental physical constants (Pi-Theory) assumes that physical reality is a single parametric spatio-temporal is the Medium.

If in the text of the article the name of the parameter has a subscript "π" it is, firstly, means that this is parameter Pi-Theory, and secondly that this parameter has a theoretical value that can be used instead of the true parameter value. A scalar parameter – it is a numeric parameter. Pi-Theory has only one free parameter is a scalar parameter of the Medium $\mathrm{p_{fr}}$.

All resulting in Pi-Theory results - this is are solutions of algebraic equations.

In PI-Theory is used Unitary system of units of measurement of dimensional parameters:

$$u_{\pi l} = 1.0[\mathrm{sm}],\ u_{\pi m} = 1.0[\mathrm{g}],\ u_{\pi t} = 1.0[\mathrm{s}],\ u_{\pi T} = 1.0\left[\mathrm{K}\right].$$

2. Final formulas

Table 1. Presents formulas for determining the values of the numerical parameters.

N	The name of the parameter and the formula Pi-Theory
1	Scalar parameter of the Medium $\mathrm{p_{fr}}$ (free parameter): $\mathrm{p_{fr}} = \pi.$
2	Scalar parameter of the elementary charge $\alpha_{\pi 0}$. Is the real root of the equation $$\varphi_{\pi 0}^3 \cdot \pi^2 \cdot \alpha_{\pi 0} \cdot \overline{\beta}_\pi = (1 + \vartriangle y_{\pi 0} \cdot \alpha_{\pi 0})^3,$$ where: $\varphi_{\pi 0} = \sqrt{2} \cdot \pi$; $\vartriangle y_{\pi 0} = \sqrt[4]{2 \cdot \pi}$; $\overline{\beta}_\pi = 1 + \overline{\beta}_{\pi 0}$; $\overline{\beta}_{\pi 0} = \alpha_{\pi 0} / \varphi_{\pi 0}$.
3	Scalar structure parameter of space-time $\mathrm{f}_{\pi s0}$: $$\mathrm{f}_{\pi s0} = \alpha_{\pi 0} \cdot \overline{\beta}_\pi .$$
4	Constant parametric bias $\vartriangle y_{\pi e}$: $$\vartriangle y_{\pi e} = \frac{\Delta_{\pi x}}{\vartriangle y_{\pi 0}^3}.$$
5	Coefficient $\Delta_{\pi x}$. Is determined from the equation $\frac{1}{\varphi_{\pi 0}} \cdot \alpha_{\pi x1,2}^2 + \alpha_{\pi x1,2} - \overline{\beta}_\pi = 0$ in the form $\Delta_{\pi x} = \frac{\alpha_{\pi x1}}{\alpha_{\pi x2}}$.
6	Constant parametric connection $\beta_{\pi e}$: $$\beta_{\pi e} = 1 + \beta_{\pi 0e};\ \beta_{\pi 0e} = \frac{\overline{\beta}_{\pi 0}}{\overline{\beta}_\pi^3}.$$
7	Scalar parameter of the elementary charge $\alpha_{\pi e}$. The real root of the equation $$\varphi_{\pi 0}^3 \cdot \pi^2 \cdot \alpha_{\pi e} \cdot \beta_{\pi e} = (1 + \vartriangle y_{\pi e} \cdot \alpha_{\pi e})^3.$$
8	Scalar structure parameter of space-time $\mathrm{f}_{\pi se}$:

N	The name of the parameter and the formula Pi-Theory

$$\mathrm{f}_{\pi se} = \alpha_{\pi e} \cdot \beta_{\pi e} .$$

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

$$\overleftrightarrow{\mathrm{f}}_{\pi s} = \sqrt[4]{\mathrm{f}_{\pi s0} \cdot \mathrm{f}_{\pi se}{}^{3}} .$$

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

$$\mathrm{f}_{\pi s} = \sqrt[3]{\frac{f_{\pi se}{}^{4}}{f_{\pi s0}}} .$$

11 Coefficient of skewness k_{π}:

$$\mathrm{k}_{\pi} = \sqrt[4]{\frac{\overleftrightarrow{\mathrm{f}}_{\pi s}}{\mathrm{f}_{\pi s}}} .$$

12 Coefficient of absolute stability $k_{\pi st}$:

$$k_{\pi st} = \mathrm{k}_{\pi}^{9} .$$

13 Scalar parameter of the elementary charge α_{π}:

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

14 Constant parametric connection β_{π}:

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

15 Constant scale invariance ψ_{π}:

$$\psi_{\pi} = k_{\pi\psi} \cdot \psi_{\pi 0} ;\ k_{\pi\psi} = \frac{2 \cdot \alpha_{\pi}^{6}}{\sqrt{\pi} \cdot \mathrm{f}_{\pi s}^{6}} ,\ \psi_{\pi 0} = 4 \cdot \pi^{6} \cdot \mathrm{f}_{\pi s}^{9} .$$

16 Constant parametric bias $\vartriangle y_{\pi}$. Determined by direct calculation from the equation

$$\varphi_{\pi 0}^{3} \cdot \pi^{2} \cdot \mathrm{f}_{\pi s} = (1 + \vartriangle y_{\pi} \cdot \alpha_{\pi})^{3} .$$

17 Constant of the strong interaction $\alpha_{\pi s}$. The real root of the equation

$$\varphi_{\pi 0}^{3} \cdot \pi^{2} \cdot \alpha_{\pi s} \cdot \beta_{\pi} = (1 + \vartriangle y_{\pi} \cdot \alpha_{\pi s})^{3} .$$

18 Coefficient of the charge asymmetry $k_{\pi q}$:

$$k_{\pi q} = \frac{\alpha_{\pi x}}{\alpha_{\pi y}} ,$$

where the coefficients $\alpha_{\pi x}$ and $\alpha_{\pi y}$ are real roots of the equations

$$\varphi_{\pi 0}^{3} \cdot \pi^{2} \cdot \alpha_{\pi x} \cdot \overline{\beta}_{\pi} = (1 + \vartriangle y_{\pi 0} \cdot \alpha_{\pi x})^{3} \text{ and } \varphi_{\pi 0}^{3} \cdot \pi^{2} \cdot \alpha_{\pi y} \cdot \beta_{\pi e} = (1 + \vartriangle y_{\pi e} \cdot \alpha_{\pi y})^{3} \text{ respectively.}$$

19 Anomaly of the magnetic moment $a_{\pi ex}$. Determined by direct calculation from the equation

$$(1 + \vartriangle y_{\pi e} \cdot \alpha_{\pi e})^{3} = k_{\pi q}^{4} \cdot (1 + \vartriangle y_{\pi e} \cdot a_{\pi ex})^{3} .$$

20 Electromagnetic the constant of asymmetry $\Delta_{\pi a}$:

$$\Delta_{\pi a} = \alpha_{\pi e} - a_{\pi ex} .$$

21 Anomaly of the magnetic moment of the electron $a_{\pi \mathrm{e}}$:

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

22 Anomaly of the magnetic moment $a_{\pi\mu x}$:

$$a_{\pi\mu x} = \frac{\mathrm{f}_{\pi se}^{3}}{a_{\pi ex}^{2}} .$$

N	The name of the parameter and the formula Pi-Theory
23	Anomaly of the magnetic moment of the muon $a_{\pi\mu}$: $a_{\pi\mu} = a_{\pi\mu x} \cdot \left(\sqrt[4]{\left(1+\vartriangle y_\pi \cdot \alpha_\pi\right)^3}\right)^3 \cdot \mathrm{k}_\pi^4$.
24	Coefficient electroweak of asymmetry $k_{\pi w}$: $k_{\pi w} = \mathrm{k}_\pi \cdot \left(\frac{1+\mathrm{f}_{\pi se}}{1+\mathrm{f}_{\pi s}}\right)^2 \cdot \left[1+\left(-\frac{(\pi-1)^2}{\pi}\right)^4 \cdot \frac{4}{\varphi_{\pi 0}} \cdot \mathrm{f}_{\pi s}^4\right]$.
25	Scalar parameter weak interaction $\alpha_{\pi w}$: $\alpha_{\pi w} = k_{\pi w}^3 - 1$.
26	Electron-proton mass ratio $r_{\pi \mathrm{ep}}$: $r_{\pi \mathrm{ep}} = \frac{m_{\pi \mathrm{e}}}{m_{\pi \mathrm{p}}} = \left[\frac{\mathrm{f}_{\pi s}\cdot(1+\vartriangle y_\pi\cdot\alpha_\pi)^3}{\sqrt[3]{\pi^2}}\right]\cdot\left(1-\frac{\alpha_\pi}{\alpha_{\pi s}}\right)\cdot k_{\pi st}$.
27	Electron-neutron mass ratio $r_{\pi \mathrm{en}}$: $r_{\pi \mathrm{en}} = \frac{m_{\pi \mathrm{e}}}{m_{\pi \mathrm{n}}} = \left[\frac{\mathrm{f}_{\pi s}\cdot(1+\vartriangle y_\pi\cdot\alpha_\pi)^3}{\sqrt[3]{\pi^2}}\right]\cdot\left(\frac{a_{\pi \mathrm{e}}+\alpha_{\pi \mathrm{w}}}{a_{\pi \mathrm{e}}+\Delta_{\pi a}}\right)$.
28	Neutron-proton mass ratio $r_{\pi \mathrm{np}}$: $r_{\pi \mathrm{np}} = \frac{m_{\pi \mathrm{n}}}{m_{\pi \mathrm{p}}} = \left(1-\frac{\alpha_\pi}{\alpha_{\pi s}}\right)\cdot\left(\frac{a_{\pi \mathrm{e}}+\Delta_{\pi a}}{a_{\pi \mathrm{e}}+\alpha_{\pi \mathrm{w}}}\right)\cdot k_{\pi st}$.
29	Proton-neutron magnetic moment ratio $r_{\pi\mu,\mathrm{pn}}$: $r_{\pi\mu,\mathrm{pn}} = \frac{\mu_{\pi \mathrm{p}}}{\mu_{\pi \mathrm{n}}} = \left[-\frac{(\pi-1)^2}{\pi}\right]\cdot\frac{(1+\alpha_{\pi \mathrm{w}})^2}{(1+\Delta_{\pi a})^2}$.
30	Muon-nuclear magneton magnetic moment ratio $r_{\pi\mu \mathrm{N}}$: $r_{\pi\mu \mathrm{N}} = \frac{\mu_{\pi\mu}}{\mu_{\pi \mathrm{N}}} = \left(-\frac{\left(2\cdot\pi-1\right)^2}{\pi}\right)\cdot\left(\sqrt[4]{\frac{\mathrm{f}_{\pi se}}{\mathrm{f}_{\pi s}}}\right)^9\cdot\left(1-\frac{\alpha_\pi}{\alpha_{\pi s}}\right)^9$.
31	Muon-proton mass ratio $r_{\pi\mu \mathrm{p}}$: $r_{\pi\mu \mathrm{p}} = \frac{m_{\pi\mu}}{m_{\pi \mathrm{p}}} = (1+a_{\pi\mu})\cdot\frac{\mu_{\pi \mathrm{N}}}{\lvert\mu_{\pi\mu}\rvert}$.

Table 2. Formulas are presented for determining the values of FPC.

N	The name of the parameter	Symbol	Formula	Unit SGS
1	Compton wavelength	$\lambda_{\pi \mathrm{C}}$	$\lambda_{\pi \mathrm{C}} = \frac{2\cdot\pi^2\cdot\alpha_\pi^2}{R_{\pi\infty}}$	sm
2	Bohr radius	$a_{\pi 0}$	$a_{\pi 0} = \frac{\alpha_\pi}{2\cdot R_{\pi\infty}}$	sm
3	electron mass*	$m_{\pi \mathrm{e}}$	$m_{\pi \mathrm{e}} = \pi^2\cdot\mathrm{f}_{\pi s}^3\cdot\lambda_{\pi \mathrm{C}}^2\cdot u_{\pi\rho S}$	g
4	quantum of circulation	$q_{\pi c}$	$q_{\pi c} = \lambda_{\pi \mathrm{C}}\cdot c$	$\mathrm{sm}^2\ \mathrm{s}^{-1}$
5	Planck constant	h_π	$h_\pi = m_{\pi \mathrm{e}}\cdot q_{\pi c}$	$\mathrm{g\ sm}^2\ \mathrm{s}^{-1}$

N	The name of the parameter	Symbol	Formula	Unit SGS
6	elementary charge	e_π	$e_\pi = (\pm\sqrt{\alpha_\pi}) \cdot \sqrt{h_\pi \cdot c}$	g $^{1/2}$ sm $^{3/2}$ s $^{-1}$
7	electron charge to mass quotient	$k_{\pi e/m}$	$k_{\pi e/m} = \frac{\lvert e_\pi \rvert}{m_{\pi \mathrm{e}}}$	g $^{-1/2}$ sm $^{3/2}$ s $^{-1}$
8	constant for Rydberg atom of protium	$R_{\pi \mathrm{H}}$	$R_{\pi \mathrm{H}} = \frac{R_{\pi\infty}}{1 + r_{\pi \mathrm{ep}}}$	sm $^{-1}$
9	proton mass	$m_{\pi \mathrm{p}}$	$m_{\pi \mathrm{p}} = \frac{m_{\pi \mathrm{e}}}{r_{\mathrm{ep}}}$	g
10	proton Compton wavelength	$\lambda_{\pi \mathrm{C,p}}$	$\lambda_{\pi \mathrm{C,p}} = r_{\mathrm{ep}} \cdot \lambda_{\pi \mathrm{C}}$	sm
11	muon mass	$m_{\pi \mu}$	$r_{\pi \mu \mathrm{p}} \cdot m_{\pi \mathrm{p}}$	g
12	muon Compton wavelength	$\lambda_{\pi \mathrm{C},\mu}$	$\lambda_{\pi \mathrm{C},\mu} = \frac{\lambda_{\pi \mathrm{C,p}}}{r_{\pi \mu \mathrm{p}}}$	sm
13	neutron mass	$m_{\pi \mathrm{n}}$	$m_{\pi \mathrm{n}} = \frac{m_{\pi \mathrm{e}}}{r_{\mathrm{en}}}$	g
14	neutron Compton wavelength	$\lambda_{\pi \mathrm{C,n}}$	$\lambda_{\pi \mathrm{C,n}} = r_{\mathrm{en}} \cdot \lambda_{\pi \mathrm{C}}$	sm
15	atomic mass constant	$m_{\pi \mathrm{u}}$	$m_{\pi \mathrm{u}} = \frac{r^2_{\pi\mu,\mathrm{pn}}}{\sqrt[3]{\pi^2}} \cdot \left(\frac{1 + r_{\pi \mathrm{ep}}}{r_{\pi \mathrm{pn}}}\right) \cdot \left(\frac{\mathrm{f}_{\pi s0}}{\mathrm{f}_{\pi s}}\right)^4 \cdot m_{\pi \mathrm{p}}$	g
16	molar Planck constant	$h_{\pi \mathrm{M}}$	$h_{\pi \mathrm{M}} = \frac{h_\pi}{m_{\pi \mathrm{u}}}$	sm ^{2} s $^{-1}$
17	Faraday constant	F_π	$F_\pi = \frac{\lvert e_\pi \rvert}{m_{\pi \mathrm{u}}}$	g $^{-1/2}$ sm $^{3/2}$ s $^{-1}$
18	Josephson constant	$K_{\pi \mathrm{J}}$	$K_{\pi \mathrm{J}} = \frac{2 \cdot \lvert e_\pi \rvert}{h_\pi}$	g $^{-1/2}$ sm $^{-1/2}$
19	von Klitzing constant	$R_{\pi \mathrm{K}}$	$R_{\pi \mathrm{K}} = \frac{h_\pi}{e^2_\pi}$	sm $^{-1}$ s
20	Planck length	$l_{\pi \mathrm{P}}$	$l_{\pi \mathrm{P}} = \psi_\pi \cdot \lambda_{\pi \mathrm{C}}$	sm
21	Planck time	$t_{\pi \mathrm{P}}$	$t_{\pi \mathrm{P}} = \frac{l_{\pi \mathrm{P}}}{c}$	s
22	Planck mass	$m_{\pi \mathrm{P}}$	$m_{\pi \mathrm{P}} = \frac{m_{\pi \mathrm{e}}}{\psi_\pi}$	g
23	Newtonian constant of gravitation	G_π	$G_\pi = \frac{h_\pi \cdot c}{m^2_{\pi \mathrm{P}}}$	g $^{-1}$ sm ^{3} s $^{-2}$
24	the matching coefficient of temperatures ($2 \cdot T_0 = 273{,}15$ K+273,16 K)	$k_{\pi T}$	$k_{\pi T} = \frac{T_{\pi 0}}{T_0}$, $T_{\pi 0} = \frac{1}{\pi \cdot \mathrm{f}_{\pi s}} \cdot u_{\pi T}$	-
25	Boltzmann constant	$k_{\pi B}$	$k_{\pi B} = \frac{3 \cdot m^2_{\pi \mathrm{e}} \cdot c^2}{\lambda^2_{\pi \mathrm{C}} \cdot u_{\pi\rho S} \cdot \sqrt{k^3_{\pi T}} \cdot T_{\pi 0}}$	g sm ^{2} s $^{-2}$ K $^{-1}$
26	molar gas constant	R_π	$R_\pi = \frac{k_{\pi B}}{m_{\pi \mathrm{u}}}$	sm ^{2} s $^{-2}$ K $^{-1}$

*- $u_{\pi\rho S}$ – the surface density of mass: $u_{\pi\rho S} = \frac{u_{\pi m}}{u^2_{\pi l}}$.

3. The results of theoretical calculations

Table 3. The results of the theoretical calculations in accordance with Table 1.

N	The name of the parameter	Symbol	Numeric value
1	the scalar parameter of the Medium	p_{fr}	3.141 592 653 589 793 238 462 643 383 2795
2	scalar structure parameter of space-time	$f_{\pi s}$	1.161 712 977 019 596 928 970 254 553 1147 x 10^{-3}
3	coefficient of skewness	k_{π}	1.000 000 081 371 686 023 215 889 742 3969
4	scalar parameter of the elementary charge	α_{π}	1.161 409 733 400 893 939 488 207 988 0708 x 10^{-3}
5	constant parametric connection	β_{π}	1.000 261 099 601 615 200 373 179 794 6737
6	coefficient of absolute stability	$k_{\pi st}$	1.000 000 732 345 412 577 634 571 480 525
7	constant scale invariance	ψ_{π}	1.669 642 831 928 813 892 580 472 151 077 x 10^{-23}
8	coefficient electroweak of asymmetry	$k_{\pi w}$	1.000 000 081 810 773 063 436 894 140 0978
9	scalar parameter weak interaction	$\alpha_{\pi w}$	2.454 323 392 693 189 976 915 245 746 5274 x 10^{-7}
10	constant of the strong interaction	$\alpha_{\pi s}$	1.571 115 208 075 978 141 954 476 726 012 x 10^{1}
11	electron-proton mass ratio	$r_{\pi ep}$	5.446 170 218 699 090 667 403 109 649 777 x 10^{-4}
12	electromagnetic the constant of asymmetry	$\Delta_{\pi a}$	1.757 552 613 321 940 865 158 064 577 x 10^{-6}
13	anomaly of the magnetic moment of the electron	$a_{\pi e}$	1.159 652 180 787 571 998 623 049 923 493 x 10^{-3}
14	anomaly of the magnetic moment of the muon	$a_{\pi \mu}$	1.165 920 932 325 338 116 640 429 308 749 x 10^{-3}
15	electron-neutron mass ratio	$r_{\pi en}$	5.438 673 445 786 830 889 662 641 220 105 x 10^{-4}
16	neutron-proton mass ratio	$r_{\pi np}$	1.001 378 419 386 085 276 312 923 899 0331
17	proton-neutron magnetic moment ratio	$r_{\pi\mu,pn}$	-1.459 898 124 622 977 783 495 815 120
18	muon-nuclear magneton magnetic moment ratio	$r_{\pi \mu N}$	-8.890 596 980 041 473 335 184 878 209 923
19	muon-proton mass ratio	$r_{\pi \mu p}$	0.112 609 527 029 494 823 131 341 129 339

Table 4. The results of the theoretical calculations in accordance with Table 2. Source data: Rydberg constant $1.097\ 373\ 156\ 8539(55)\cdot 10^{5}\left[\mathrm{sm}^{-1}\right]$ (CODATA 2010), speed of light in vacuum $2.997\ 924\ 58\cdot 10^{10}\left[\mathrm{sm}\cdot\mathrm{s}^{-1}\right]$.

N	The name of the parameter	Symbol	Numerical value (SGS)	Unit SGS
1	Compton wavelength	$\lambda_{\pi C}$	2.426 310 240 7357 x 10^{-10}	sm
2	Bohr radius	$a_{\pi 0}$	5.291 772 111 1867 x 10^{-9}	sm
3	electron mass	$m_{\pi e}$	9.109 382 325 3402 x 10^{-28}	g
4	quantum of circulation	$q_{\pi c}$	7.273 895 109 4073	$sm^{2}\ s^{-1}$
5	Planck constant	h_{π}	6.626 069 154 6014 x 10^{-27}	$g\ sm^{2}\ s^{-1}$
6	elementary charge	e_{π}	4.803 204 354 1649 x 10^{-10}	$g^{1/2}\ sm^{3/2}\ s^{-1}$
7	electron charge to mass quotient	$k_{\pi e/m}$	5.272 810 145 2098 x 10^{17}	$g^{-1/2}\ sm^{3/2}\ s^{-1}$
8	constant for Rydberg atom of protium	$R_{\pi H}$	1.096 775 834 0655 x 10^{5}	sm^{-1}
9	proton mass	$m_{\pi p}$	1.672 621 669 8229 x 10^{-24}	g
10	proton Compton wavelength	$\lambda_{\pi C,p}$	1.321 409 857 4420 x 10^{-13}	sm

N	The name of the parameter	Symbol	Numerical value (SGS)	Unit SGS
11	muon mass	$m_{\pi\mu}$	1.883 531 351 3804 x 10^{-25}	g
12	muon Compton wavelength	$\lambda_{\pi C,\mu}$	1.173 444 105 7513 x 10^{-12}	sm
13	neutron mass	$m_{\pi n}$	1.674 927 243 9581 x 10^{-24}	g
14	neutron Compton wavelength	$\lambda_{\pi C,n}$	1.319 590 907 7531 x 10^{-13}	sm
15	atomic mass constant	$m_{\pi u}$	1.660 539 062 8310 x 10^{-24}	g
16	molar Planck constant	$h_{\pi M}$	3.990 312 123 8863 x 10^{-3}	$sm^2\ s^{-1}$
17	Faraday constant	F_π	2.892 557 279 5476 x 10^{14}	$g^{-1/2}\ sm^{3/2}\ s^{-1}$
18	Josephson constant	$K_{\pi J}$	1.449 789 986 2181 x 10^{17}	$g^{-1/2}\ sm^{-1/2}$
19	von Klitzing constant	$R_{\pi K}$	2.872 062 163 8102 x 10^{-8}	$sm^{-1}\ s$
20	Planck length	$l_{\pi P}$	4.051 071 501 4798 x 10^{-33}	sm
21	Planck time	$t_{\pi P}$	1.351 291 999 9741 x 10^{-43}	s
22	Planck mass	$m_{\pi P}$	5.455 886 822 7026 x 10^{-5}	g
23	Newtonian constant of gravitation	G_π	6.673 381 632 9142 x 10^{-8}	$g^{-1}\ sm^3\ s^{-2}$
24	Boltzmann constant	$k_{\pi B}$	1.380 649 288 4109 x 10^{-16}	$g\ sm^2\ s^{-2}\ K^{-1}$
25	molar gas constant	R_π	8.314 464 376 7493 x 10^{7}	$sm^2\ s^{-2}\ K^{-1}$

Table 5 shows the comparison of data CODATA 2010 with theoretical calculations of the Pi-Theory.

Table 5. In accordance with the list of parameters from tables 1 and 2 shows: the values of FPC recommended by CODATA (2010) for international use – from the publication on the NIST website at the address http://physics.nist.gov/cuu/Constants/index.html; the calculation results from tables 3 and 4; the results of data comparison (column 6), δ_r – the relative uncertainty.

parameter a (CODATA)	Numerical value, SGS (CODATA 2010)	Relative std.	parameter a* (Pi-Theory)	Numerical value, SGS (Pi-Theory)	$\delta_r = \frac{a^* - \bar{a}}{a^*}$
1	2	3	4	5	6
α	7.297 352 5698(24) x 10^{-3}	3.2 x 10^{-10}	$\alpha_\pi \cdot 2\pi$	7.297 352 572 519 857 x 10^{-3}	3.7 x 10^{-10}
a_e	1.159 652 180 76(27) x 10^{-3}	2.3 x 10^{-10}	$a_{\pi e}$	1.159 652 180 787 572 x 10^{-3}	0.2 x 10^{-10}
a_μ	1.165 920 91(63) x 10^{-3}	5.4 x 10^{-7}	$a_{\pi\mu}$	1.165 920 932 325 338 x 10^{-3}	0.2 x 10^{-7}
m_e / m_p	5.446 170 2178(22) x 10^{-4}	4.1 x 10^{-10}	$r_{\pi ep}$	5.446 170 218 699 091 x 10^{-4}	1.7 x 10^{-10}
m_e / m_n	5.438 673 4461(32) x 10^{-4}	5.8 x 10^{-10}	$r_{\pi en}$	5.438 673 445 786 832 x 10^{-4}	-0.6 x 10^{-10}
m_n / m_p	1.001 378 419 17(45)	4.5 x 10^{-10}	$r_{\pi np}$	1.001 378 419 386 085	2.2 x 10^{-10}
μ_p / μ_n	-1.459 898 06(34)	2.4 x 10^{-7}	$r_{\pi\mu,pn}$	-1.459 898 124 622 978	0.4 x 10^{-7}
$\mu_{\pi\mu} / \mu_{\pi N}$	-8.890 596 97(22)	2.5 x 10^{-8}	$r_{\pi\mu N}$	-8.890 596 980 041 473	0.1 x 10^{-8}
$m_{\pi\mu} / m_{\pi p}$	0.112 609 5272(28)	2.5 x 10^{-8}	$r_{\pi\mu p}$	0.112 609 527 029 495	-0.1 x 10^{-8}
λ_C	2.426 310 2389(16) x 10^{-10}	6.5 x 10^{-10}	$\lambda_{\pi C}$	2.426 310 240 7357 x 10^{-10}	7.6 x 10^{-10}
a_0	0.529 177 210 92(17) x 10^{-8}	3.2 x 10^{-10}	$a_{\pi 0}$	0.529 177 211 1187 x 10^{-8}	3.8 x 10^{-10}
m_e	9.109 382 91(40) x 10^{-28}	4.4 x 10^{-8}	$m_{\pi e}$	9.109 382 325 3402 x 10^{-28}	-6.4 x 10^{-8}
h / m_e	7.273 895 1040(47)	6.5 x 10^{-10}	$q_{\pi c}$	7.273 895 109 4073	7.4 x 10^{-10}
m_μ	1.883 531 475(96) x 10^{-25}	5.1 x 10^{-8}	$m_{\pi\mu}$	1.883 531 351 3804 x 10^{-25}	-6.6 x 10^{-8}

parameter a (CODATA)	Numerical value, SGS (CODATA 2010)	Relative std.	parameter a* (Pi-Theory)	Numerical value, SGS (Pi-Theory)	$\delta_r = \frac{a^* - \bar{a}}{a^*}$
1	2	3	4	5	6
m_{p}	1.672 621 777(74) x 10^{-24}	4.4 x 10^{-8}	$m_{\pi \text{p}}$	1.672 621 669 8229 x 10^{-24}	-6.4 x 10^{-8}
m_{n}	1.674 927 351(74) x 10^{-24}	4.4 x 10^{-8}	$m_{\pi \text{n}}$	1.674 927 243 9581 x 10^{-24}	-6.4 x 10^{-8}
$\lambda_{\text{C},\mu}$	1.173 444 103(30) x 10^{-12}	2.5 x 10^{-8}	$\lambda_{\pi \text{C},\mu}$	1.173 444 105 7513 x 10^{-12}	0.2 x 10^{-8}
$\lambda_{\text{C,p}}$	1.321 409 856 23(94) x 10^{-13}	7.1 x 10^{-10}	$\lambda_{\pi \text{C,p}}$	1.321 409 857 4420 x 10^{-13}	9.2 x 10^{-10}
$\lambda_{\text{C,n}}$	1.319 590 9068(11) x 10^{-13}	8.2 x 10^{-10}	$\lambda_{\pi \text{C,n}}$	1.319 590 907 7531 x 10^{-13}	7.2 x 10^{-10}
m_{u}	1.660 538 921(73) x 10^{-24}	4.4 x 10^{-8}	$m_{\pi \text{u}}$	1.660 539 062 8310 x 10^{-24}	8.5 x 10^{-8}
l_{P}	1.616 199(97) x 10^{-33}	6.0 x 10^{-5}	$l_{\pi \text{P}} / \sqrt{2\pi}$	1.616 143 702 8696 x 10^{-33}	-3.4 x 10^{-5}
t_{P}	5.391 06(32) x 10^{-44}	6.0 x 10^{-5}	$t_{\pi \text{P}} / \sqrt{2\pi}$	5.390 875 119 5788 x 10^{-44}	-3.4 x 10^{-5}
m_{P}	2.176 51(13) x 10^{-5}	6.0 x 10^{-5}	$m_{\pi \text{P}} / \sqrt{2\pi}$	2.176 583 930 6611 x 10^{-5}	3.4 x 10^{-5}
h	6.626 069 57(29) x 10^{-27}	4.4 x 10^{-8}	h_{π}	6.626 069 154 6014 x 10^{-27}	-6.3 x 10^{-8}
G	6.673 84(80) x 10^{-8}	1.2 x 10^{-4}	G_{π}	6.673 381 632 9142 x 10^{-8}	-0.7 x 10^{-4}
k	1.380 6488(13) x 10^{-16}	9.1 x 10^{-7}	$k_{\pi B}$	1.380 649 288 4109 x 10^{-16}	3.5 x 10^{-7}
R	8.314 4621(75) x 10^{7}	9.1 x 10^{-7}	R_{π}	8.314 464 376 7493 x 10^{7}	2.7 x 10^{-7}

4. Conclusions

From comparison of the data presented in table 5, it follows that proposed in this paper analytical method suitable for the theoretical definition of FPC.

Note that with fixed values of the speed of light in vacuum, the temperature of the triple point of water 273.16 K and of the temperature of the melting point of ice is 273.15 K, the accuracy of the determination of the numerical values of FPC is determined only by the accuracy of the numerical value of the Rydberg constant. This circumstance, according to the author of this article, is the undoubted advantage of the proposed method theoretical definitions of FPC.