Exact Calculation of the Age of the Universe dependent on Physical Constants

Andreas Ball

Abstract:

The british Physicist Paul Dirac (1902 - 1984) founded the Large Number Hypothesis[1], which handles with strange relations using numbers in order of magnitude 10^{40}. Also the german Physicist, Mathematician and Philosopher Hermann Weyl (1885 - 1955) was occupied with relations of High Order Numbers. In this report an Equation is presented, which gives the Age of the Universe within its Tolerance Range in dependence on Physical Constants.

Equation for the Age of the Universe:

The Age of the Universe is given to $13{,}787 \pm 0{,}02 * 10^9$ years[2].

The Age of the Universe Age_{Univ} in Unit s is: $13{,}787 * 10^9 * 3600 * 24 * 356{,}256 = 4{,}35092 * 10^{17}$ s.

The maximal allowable relative tolerance range is: $(13{,}787 \pm 0{,}02) / 13{,}787$

that means a relative tolerance range from 0,99855 to 1,00145

The Large Number Equation LN with use of the Age of the Universe, the Light Velocity c_L and the Electron Radius r_e is written to:

$$LN = Age_{Univ} * c_L / r_e = 4{,}6288 * 10^{40} \qquad \text{(LN1)}$$

A pretty simple, but harmonic Approximation of the quantity LN can be given by the following Equation LN_{Appr}, at which the Fine Structure Constant α and the Circle Figure π are used:

$$LN_{Appr} = (4 * \pi / \alpha)^{4*\pi} = 4{,}6274 * 10^{40} \qquad \text{(LN2)}$$

The values of the used quantities Light Velocity c_L, Proton Radius r_e and Fine Structure Constant α can be taken from the section Used Data of Physical Constants at the next page.

The Equation for the Approximation Age_{Univ_Appr} of the Universe Age is given by Equating of Equations (LN1) and (LN2) and is written to:

$$Age_{Univ\_Appr} = (4 * \pi / \alpha)^{4*\pi} * r_e / c_L = 4{,}3496 * 10^{17} \text{ s} = 13{,}783 * 10^9 \text{ a} \qquad \text{(Age)}$$

The ratio of the calculated value Age_{Univ_Appr} to the set value is:

$(13{,}783) / 13{,}787 = 0{,}99969$

The calculated value Age_{Univ_Appr} is far within the tolerance range of the set value[2] of the Universe Age.

The Approximation of the Large Number LN isn't to difficult to find. One takes an Equation with the form $(A * B)^A$ preferably for the Quantities with relatively big tolerances, as for example the Gravity Constant G or the Age of Universe. One can determine quite fast the exact value of the quantity A by use of the tool "Search Target Value", which is offered at most spreadsheet programs.
By this circumstance it may possible, that Equation (LN2) was already found by someone else, but who is not known to the author. If this person or group had found Equation (LN2) before the time, when the author of this report found the Equation (LN2), this person or group naturally can claim its creation.

Conclusion

By application of the Physical Constants Light Velocity c, Electron Radius r_e and Fine Structure Constant α and of a relative simple, but harmonic Equation for a Large Number LN a good Approximation could

be presented for the Age of the Universe.

Please look again at the impressing term: $(4 * \pi / \alpha)^{4*\pi}$

At last the author takes the permission to present an aphorism, which begins with a question:

Dear Reader, can you imagine the invisible note below this mathematical term and the signature?

"Dear Physicists, I hope it is now possible for you to see, that I am the Creator of the Universe.
Acknowledge it and realize, that your professional income is dependent on my creations!"
[Signature] God

Used Data of Physical Constants:

Fine Structure Constant α[3.1]:	$7.297\,352\,5693(11) * 10^{-3}$
Inverse of Fine Structure Constant $1/\alpha$[3.2]:	137.035 999 084(21)
Light velocity c_L[3.3]:	299 792 458 m/s
Radius of Electron r_e[3.4]:	$2.817\,940\,3262(13) * 10^{-15}$ m

Literature and wikipedia.de-Entries:

The data of the physical Constants are taken from the entries of Wikipedia Germany. The Physical Constants given in the corresponding entries refer mostly to CODATA 2018.
The reason of this choice can be read in the authors report[4] at section 8 (Page 13 and 14). For the calculation of the Universe Age by the Equation (Age) it takes a very neclegtable influence, if one uses the values of CODATA 2018 or a later CODATA-Version.

[1] Wikipedia.de-Entry "Large Number Hypothesis"; Status February 2025

[2] Wikipedia.de-Entry "Universum"; Status February 2025
2. Planck 2018 results. VI. Cosmological parameters. In: Astronomy & Astrophysics. Band 641. Planck Collaboration, 2020, S. A6, PDF Seiten 15, Tabelle 2: "Age/Gyr", letzte Spalte, doi:10.1051/0004-6361/201833910 (https://doi.org/10.1051/0004-6361%2F201833910), arxiv:1807.06209 (https://arxiv.org/abs/1807.06209), bibcode:2020A&A...641A...6P (https://ui.adsabs.harvard.edu/abs/2020A&A...641A...6P) (englisch)

[3] Wikipedia.de-Entry "Physikalische Konstante"; Status May 2024

[3.1] Fine Structure Constant α:
25. CODATA Recommended Values. (https://physics.nist.gov/cgi-bin/cuu/Value?alph) NIST, abgerufen am 20. April 2020 (englisch, Wert für die Feinstrukturkonstante)

[3.2] Inverse of Fine Structure Constant α^{-1}:
26. CODATA Recommended Values. (https://physics.nist.gov/cgi-bin/cuu/Value?alphinv) NIST, abgerufen am 20. April 2020 (englisch, Kehrwert der Feinstrukturkonstante)

[3.3] Light Velocity c:
12. CODATA Recommended Values. (https://physics.nist.gov/cgi-bin/cuu/Value?c) NIST, abgerufen am 3. Juni 2019 (englisch, Wert für die Lichtgeschwindigkeit).

[3.4] Electron Radius re:
45. CODATA Recommended Values. (https://physics.nist.gov/cgi-bin/cuu/Value?re) NIST, abgerufen am 3. Juni 2019 (englisch, Wert für den klassischen Elektronenradius).

[4] From the Electron to the Flower of Life - Proofs of God;
Andreas Ball; Published at viXra: viXra submission 2410.0077v3; 2024-11-28