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Coexistence in Bohr Orbit

(Addendum article)

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Abstract: : *The double surface characteristics of Bohr orbit were supplemented.*

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1. Introduction

In the previous article [1] the elliptic characteristics of Bohr orbit were mentioned. Let us complete them with the hyperbolic characteristics.

2. The Inverse Fine Structure Constant

It counts the path of the electron in Bohr orbit in Compton wavelengths of the electron. The value is average elliptic-hyperbolic and is implicitly related to the elliptic value as follows [2]:

$$137.035\,999\,177 = {\alpha^{-1}}_{elliptic-hyperbolic} = {\alpha^{-1}}_{elliptic}\left(2 - \frac{1}{\sqrt{1 + \frac{\pi^2}{\alpha^{-2}_{elliptic}}}}\right). \qquad (1a)$$

Giving the next elliptic Bohr orbit path applying the CODATA value of the inverse fine structure constant (1a):

$${\alpha^{-1}}_{elliptic} = 136{,}999\,992\,920\,8. \qquad (1b)$$

And with the help of the other equation [2] the hyperbolic Bohr orbit path is is given:

$${\alpha^{-1}}_{hyperbolic} = {\alpha^{-1}}_{elliptic}\left(2\sqrt{1 + \frac{\pi^2}{{\alpha^{-1}}_{elliptic}{}^2}} - 1\right) = 137{,}072\,024\,364\,4. \qquad (1c)$$

3. The Unit

Let us take into account the unit in the light of double-surface geometry, too.

The average elliptic-hyperbolic unit is implicitly related to the elliptic unit as follows:

$$1 = unit_{elliptic-hyperbolic} = unit_{elliptic}\left(2 - \frac{1}{\sqrt{1 + \frac{\pi^2}{unit^2_{elliptic}}}}\right). \qquad (2a)$$

Giving the elliptic unit:

$$unit_{elliptic} = 0.546\,897\,427\,7\,\ldots \qquad (2b)$$

And the hyperbolic unit is explicitly related to the elliptic unit as follows:

$$unit_{hyperbolic} = unit_{elliptic}\left(2\sqrt{1+\frac{\pi^2}{{unit_{elliptic}}^2}}-1\right). \quad (2c)$$

Giving the hyperbolic unit:

$$unit_{hyperbolic} = 5.830\ 782\ 776\ 7\ \ldots \quad (2d)$$

4. The Ratio of the Elliptic Bohr Orbit Path and the Elliptic Unit

The ratio R_{elliptic} of the elliptic Bohr orbit path, denoted ${\alpha^{-1}}_{elliptic}$, and the elliptic unit, denoted $unit_{elliptic}$, is the next:

$$R_{\text{elliptic}} = \frac{{\alpha^{-1}}_{elliptic}}{unit_{elliptic}} = \frac{136.999\ 992\ 920\ 8}{0.546\ 897\ 427\ 7} = 250.504. \quad (3a)$$

It counts the number of steps required to wave around one elliptic Bohr orbit.

5. The Ratio of the Hyperbolic Bohr Orbit Path and the Hyperbolic Unit

The ratio R_{elliptic} of the hyperbolic Bohr orbit path, denoted ${\alpha^{-1}}_{hyperbolic}$, and the hyperbolic unit, denoted $unit_{hyperbolic}$, is the next:

$$R_{\text{hyperbolic}} = \frac{{\alpha^{-1}}_{hyperbolic}}{unit_{hyperbolic}} = \frac{137.072\ 024\ 364\ 4}{5.830\ 782\ 776\ 7} = 23.508. \quad (3b)$$

It counts the number of steps required to wave around one hyperbolic Bohr orbit.

6. Conclusion

From the double surface point of view both Bohr orbit paths – elliptic as well as hyperbolic – are extremely unstable, since the electron wave breaks down after just one round in Bohr orbit path. But being sacrificed on one sphere enables to be raised on the other. And vice versa. Thus, coexistence makes sense.

Dedication

To Jerome K. Jerome (1859 – 1927) and his quote:

“A new life begins for us with every second. Let us go forward joyously to meet it. We must press on whether we will or no, and we shall walk better with our eyes before us than with them ever cast behind.”

References

[1] Janez Špringer. " Offered Inverse Fine Structure Constant” International Journal of Advanced Research in Physical Science (IJARPS), Vol 11, issue 07, pp. 1-3., 2024.

[2] Špringer J. Double Surface and Fine Structure, Progress in Physics, 2013, v. 2, 105-106

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