Exact formula for the Fine Structure constant α in terms of the Golden Ratio φ

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Abstract

We propose the exact formula for the Fine Structure constant α in terms of the Golden Ratio φ:

$\alpha^{-1}=360\cdot\varphi^{-2}-2\cdot\varphi^{-3}+(3\cdot\varphi)^{-5}$

Introduction

Dr. Rajalakshmi Heyrovska has found that the Golden Ratio φ provides a quantitative link between various known quantities in atomic physics,research in this book chapter entitled "The Golden ratio in the creations of Nature arises in the architecture of atoms and ions". While searching for the exact values of ionic radii and for the significance of the ionization potential of hydrogen,Dr. Heyrovska has found that the Bohr radius can be divided into two Golden sections pertaining to the electron and proton. More generally,it was found that φ is also the ratio of anionic to cationic radii of any atom,their sum being the covalent bond length. After that she showed,among other facts,that many bond lengths in organic and inorganic molecules behave additively,and are the sum of the covalent and the ionic radii,whether partially or fully ionic or covalent.

A new interpretation and a very accurate value of the fine structure constant α^{-1} has been discovered in terms of the Golden Angle. Dr. Heyrovska proposed another interpretation of α based on the observation that it is close to the Golden Angle. Fine Structure constant can also be formulated for the first time exclusively in terms of the Golden Ratio as follows:

$\alpha^{-1}=360\cdot\varphi^{-2}-2\cdot\varphi^{-3}=137{,}03562809......$ (1)

Measurement of Fine Structure constant

The 2.018 CODATA recommended value of α is:

$\alpha=q_e^2/4\cdot\pi\cdot\varepsilon_0\cdot\hbar\cdot c=0.0072973525693(11)$ (2)

With standard Uncertainty $0{,}0000000011\times10^{-3}$ and Relative Standard Uncertainty $1{,}5\times10^{10}$. For reasons of convenience,historically the value of the reciprocal of the fine-structure constant is often specified. The 2.018 CODATA recommended value is given by:

$\alpha^{-1}=137{,}035999084(21)$. (3)

With standard Uncertainty $0{,}000000021\times10^{-3}$ and Relative Standard Uncertainty $1{,}5\times10^{10}$. There is general agreement for the value of α,as measured by these different methods. The preferred methods in 2.019 are measurements of electron anomalous magnetic moments and of photon recoil in atom interferometry. The most precise value of α obtained experimentally (as of 2.012) is based on a measurement of g using a one-electron so-called "quantum cyclotron" apparatus,together with a calculation via the theory of QED that involved 12.672 tenth-order Feynman diagrams:

α^{-1}=137,035999174(35). (4)

This measurement of α has a relative standard uncertainty of $2{,}5\times10^{-10}$. This value and uncertainty are about the same as the latest experimental results. Further refinement of this work were published by the end of 2.020,giving the value:

α^{-1}=137,035999206(11). (5)

with a relative accuracy of 81 parts per trillion.

Exact formula for the Fine Structure constant α

There is a dream,which,albeit more often not confessed,occupies the most secret aspirations of theoreticians and is that of reducing the various constants of Physics to simple formula involving integers and transcendent numbers. We propose the exact formula for the Fine Structure constant α in terms of the Golden Ratio φ:

$$\boldsymbol{\alpha^{-1}=360\cdot\varphi^{-2}-2\cdot\varphi^{-3}+(3\cdot\varphi)^{-5}} \qquad (6)$$

with numerical value:

α^{-1}=137,03599916476564.......... (7)

This numerical value is the average of the measurements (3),(4) and (5).
We believe that the formula (6) is the exact formula for the Fine Structure constant α.

Conclusions

We presented new Exact formula for the Fine Structure constant α in terms of the Golden Ratio φ:

$$\alpha^{-1}=360\cdot\varphi^{-2}-2\cdot\varphi^{-3}+(3\cdot\varphi)^{-5}$$

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