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A Quantum Melody and Painting of Dancing Electron

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ABSTRACT

The absolute boundaries of the computational entropy of an elementary quantum unit of electric charge are determined analytically and confirmed by the new SI-2019 metric. It is shown that the unit of charge of an electron is not constant, but in fact, is a harmonic variable in the velocity field of relative space-time. For the first time, the final matrix of elementary electric charges is calculated with a finite accuracy of 1/10^64, which is enough for mono-quantum communication technology and processing of monophoton information.

INTRODUCTION

We organized a study on whether quantum analogues of classical theorems have computational entropy, exploring the extent to which computational entropy can be applied in a quantum setting. Entropy is a central concept in both classical and quantum information theory, measuring the uncertainty and the information content in the state of a physical system. Electron is an elementary particle that is a fundamental constituent of matter, having a negative electric charge of approximately 1.602/10^19 coulomb, a mass of 9.108/10^31 kilograms, and a spin of ½. The particle exists independently or as the component outside the nucleus of an atom.

Our work, centered around a quantum harmonic oscillator, is a quantum mechanical analogue of a classical harmonic oscillator. Since an arbitrary potential can usually be approximated as a harmonic potential in the vicinity of a stable equilibrium point, it is one of the most important model systems in quantum mechanics. In addition, it is one of the few quantum-mechanical systems for which an exact analytical solution is known.

For the exact calculation of the entropy matrix of the electric charge, we used mathematical and physical values of quantum constants and their relative means: matrix of entropy of elementary charge is [Qi] = Sqrt [AF * RP / (C ... TE ... TA ... TK)], where AF is the fine structure constant, RP is the Dirac constant (reduced Planck constant), C is the speed of light in free space (the upper limit of the speed of rotation), and TE, TA, TK are characteristic points of vibrational (radial) speed or, equivalently, temperature (rating of tempo).

The SI committees had long considered redefining the SI units entirely in terms of physical constants so as to remove their dependence on physical artifacts (such as m, s, kg): for this to work, it was necessary to fix the values of the basic physical constants. From the redefinition of SI base units, which took effect on 20 May 2019, the electron charge equals exactly 1.602176634×10−19 coulomb. Making the value of the elementary charge exact implies that the value of electric constant, which was an exact value before, is now subject to experimental determination.

On the other hand, quantum communication is indeed a strange process, but one of the strangest forms of it is called counterfactual communication when particles do not move between two recipients. Theoretical physicists have long assumed that such a form of communication would be possible, but now researchers were able to experimentally achieve it - transfer a black and white raster image from one place to another without sending any physical particles. Such communication requires the highest accuracy (up to 64 bits) to provide results for processing photonic information. But a special form of communication does require special math [1]-[3].

FAIR RECURSIVE ARITHMETIC OF QUANTUM INFORMATION PROCESSING

The seven basic units of quantum metric, first introduced by E. Machusky in [1], are calculated below with final possible accuracy and identified by the names of the first investigators:

Speed unit of Maxwell C = [Integer {10^8*(C/10^7)^(1/64)}/10^8+4*pi*C/10^18)^64*10^7]

C = [299792457.86759133843368398914990500927337258665405914040533114633]

Temperature unit of Kelvin K = [E+AS+BS]

K = [2.7315999984590452353602874713526624977572470936999595749669676277]

A = 1/Lim{Sum{729927/10^(8*N)}} = 137 – integer of Sommerfeld-Schrödinger

AS = Lim{Sum{[A+(A-100)*N]/10^(3*N+2)}} = 729/10^5 – ratio of Schrödinger-Sommerfeld

B = 602214183 – integer of Avogadro-Dalton

BS = Lim{Sum{B/10^(3*N+8)}} = 602817/10^8 – ratio of Dalton-Avogadro

R = Integer{10^8*(C/10^7)^(1/64)} = 105456978 – integer of Dirac-Maxwell=

Quantum unit C is the stroboscopic limit of the translation velocity of a harmonic circular motion of pulsating helix. In a decimal positional system, unit C cannot be calculated with an accuracy better than 1/10^64. Quantum unit K is the stroboscopic limit of the progressive velocity of harmonic radial movement of the core of the pulsating spiral and should also be estimated with an accuracy of 10^(-64). With the appropriate level of accuracy, we must cut off the numbers *pi* and *e* when separately evaluating the parameters of the harmonic circular and harmonic radial motions of a pulsating sphere:

Decimally normalized spatial unit of Pythagoras [Integer {pi*10^64}/10^64] = PI

PI = [3.1415926535897932384626433832795028841971693993751058209749445923]

Decimally normalized temporal unit of Euler [Integer {e*10^64}/10^64] = E

E = [2.7182818284590452353602874713526624977572470936999595749669676277]

On the other (physical) hand, the constants C = 299792458 and K = 2.7316, carefully measured and recommended by CODATA many years ago, were defined by the convention as exact. But the last digits are not entirely accurate due to measurement errors. Obviously, the length of the nine-digit number C limits the metric accuracy of the velocity unit at the level 1/10^8. The length K of five digits constraints the metric accuracy of the temperature at the level 1/10^4. At the same time, modern quantum physics successfully works with quantum units at the Boltzmann level of 1/10^23, Dalton level of 1/10^27, Planck level of 1/10^34, and Avogadro level of 10^23.

Two-dimensional distribution of the inverse perimeter of the pulsating sphere [2] gives a partial set of perimetral Planck units [Pi] = 2*pi*(1+2/100*(e+[Ai]*(1+Sqrt(2*pi*e/100)))) = 2*pi*[Ri] and describes the boundaries of the entropy of shadow pattern of a rotating polygon with the mantissa length of 80 digits

A1 = 10^64/A

0.0072992700729927007299270072992700729927007299270072992700729927

AF = 10^64/ (A+36/1000)

0.00729735252050556058262062523716395691643071893517032020782859978399836539303541

A0 = 10^64*(pi*e/100)^2

0.00729270605939021127239560919002866590988158609611640456003218830000000000000000

AS = 10^64/100/(10/(10-1))^3

0.00729000000000000000000000000000000000000000000000000000000000000026316900000000

We define the computational operator Med (median) as the average of four values – the root mean square MR = Sqrt ((x^2+y^2)/2), the arithmetic mean MA = (x+y)/2, the geometric mean MG = Sqrt(x*y), harmonic mean MH = 2/(1/x+1/y), and Med = Sum{MR+MA+MG+MH}/4.

Med {A0…A1} = A01

0.0072959888043757842084968448730367070357089429622741386541873110

0.0072959880661914560011613082446493694512911580115618519150525905

0.0072959876970992545539476737851829490599535949810285144493256103 = A01

0.0072959873280070531067302610268957150629141639034229072047857906

0.0072959865898227248994022809961500046899001150468551600232767492

Med {A0…AS} = A0S

0.0072913531552334887471248245970220402892754908835148268835784474

0.0072913530296951056361978045950143329549407930480582022800160942

0.0072913529669259130000099279645365046872417040592615585314036873 = A0S

0.0072913529041567203638220327267588572187075948040865762717356223

0.0072913527786183372528950499393507882860429375013866286902845851

Med {A0S…A01} = AP

0.0072936707001523930183922449744757788874017665795658772735208872

0.0072936703320125837769788008748597268735976495201450364903646488

0.0072936701479426698655503708703505315837856995667187113618828370 = AP

0.0072936699638727559541214719270856449944045257299712242158171091

0.0072936695957329467127089657049809755797388564371927074678287030

PP = 2*pi*(1+2/100*(e+AP*(1+Sqrt (2*pi*e/100)))) – Planck constant

6.626070011044827488884802944526362618609912072914172744185048157

RP = PP/(2*pi) – reduced Planck constant

1.0545717955307538179313897147725079118580446565232636184140812915

The two-dimensional distribution of the inverse radius of the pulsating spiral gives a partial set of Dirac units [Ri] as well as Maxwell-Kelvin units C, TE, TA, TK and describes the boundaries of the entropy of the shadow pattern of the rotating spiral:

C = (R/10^8+4*pi*C/10^18)^64*10^7 =

299792457.86759133843368398914990500927337258665405914040533114633

TE= (R/10^8+1/e/10^8)^64*10^7 =

299792456.25727418828688602730303276133755256562854721737070348839

TA=(R/10^8+1/(e+AS)/10^8)^64*10^7

299792456.07825451280712483094527546296531941425460307995898805333

TK = (R/10^8+1/(e+AS+BS)/10^8)^64*10*7 =

299792455.93094319778705725499466562864791705139878708251387344693

Then we get the distribution of decimally normalized value of electric charge in the final form:

Q(C) = Sqrt (10^11*AF*RP/C) =

1.602176612636195546736442495048405758567442275473487846777297171

Q (E) = Sqrt (10^11*AF*RP/TE) =

1.6021766169391932032443046297690242223610251532998773657179149426

Q (A) = Sqrt (10^11*AF*RP/TA) =

1.6021766174175593731856005026987650215294351079877590541241119522

Q (K) = Sqrt (10^11*AF*RP/TK) =

1.6021766178111962704922448742721753404768159327667537183577391612

Comparison of analytically obtained and CODATA recommended values of the elementary charge shows a discrepancy, starting from the 8th digit of the mantissa. And this is the officially declared ultimate accuracy of the SI-2019 quantum metric.

CONCLUSION

Using our calculations and hypothesis, we were able to derive a quantum matrix of electric charge. Further research using our analytical toolkit will allow to further discover the intrinsic relationship between quantum calculations and the natural sciences. Our current findings confirm the presence of quantum song and a picture of subatomic space.

References

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