INTRODUCTION TO NUMBER THEORY BY ANDREW NASSIF

Number Theory is known to be a purely mathematical branch devoted mainly to the study of integers. Number Theorist also continue to study prime numbers as well as the scientific properties of objects made out of integers which are mainly in forms of rational numbers. This can also be defined as generalizations of integers[1], which are also exemplified as algebraic integers.

Questions that are included in number Theory can be defined throughout analytical objects or unsolved questions[2] or even graphical functions such as the Zeta function[3]. This can correspond with Elementary Geometry and Algebraic Number Theory, though Elementary Geometry isn't as complex. A root subject of both fields can be known as: Diophantine Geometry.

*This will lead to development of more scientific theories and even more expansions in mathematical physics.

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[1] **^** Neugebauer (Neugebauer 1969, pp. 36–40) discusses the table in detail and mentions in passing Euclid's method in modern notation (Neugebauer 1969, p. 39). Friberg 1981, p. 30

[2] ^ ***a b*** Apostol 1976, p. 79

[3] Apostol, T. M. (2010), "Zeta and Related Functions", in Olver, Frank W. J.; Lozier, Daniel M.; Boisvert, Ronald F. et al., *NIST Handbook of Mathematical Functions*, Cambridge University Press, ISBN 978-0521192255, MR2723248

Answers and Proofs to Two Millennium Prize Problems by Andrew Nassif

I have solved the P vs. NP problems and proved that the Zeta function in the Riemann Hypothesis in infinite. Now, for many years people have been trying to solve it, but has not provided logical solutions to the so long conundrum. However, I have solved it logically through the only possible explanation. I am not sure if it can be checked thoroughly by people who haven't solved the problem yet, but I do know that they should be able to identify that my answers do make sense indeed.

This is the basic explanation of the P vs. NP Suppose that you are organizing housing accommodations for a group of four hundred university students. Space is limited and only one hundred of the students will receive places in the dormitory. To complicate matters, the Dean has provided you with a list of pairs of incompatible students, and requested that no pair from this list appear in your final choice. This is an example of what computer scientists call an NP-problem, since it is easy to check if a given choice of one hundred students proposed by a coworker is satisfactory (i.e., no pair taken from your coworker's list also appears on the list from the Dean's office), however the task of generating such a list from scratch seems to be so hard as to be completely impractical. Indeed, the total number of ways of choosing one hundred students from the four hundred applicants is greater than the number of atoms in the known universe! Thus no future civilization could ever hope to build a supercomputer capable of solving the problem by brute force; that is, by checking every possible combination of 100 students.

My Answer is quite simple, first of all the different combination of students would logically have to represent 400!, next there are 300 pairs of students that can't be picked and 100 that will be picked. The 300 pairs can logically be represented by the following: 100!*3. The final solution to this problem is to get: ((400!)-(100!*3)) as the solution the P vs. NP. This same method can be used as a logical consideration between methods of patterns and the complexity of different group, orders, and equations, and would especially be a representation of how computer programming would work.

The reason why is that this does correspond in computer language as going with the mathematical and polynomial-time algorithms that P does equal NP in terms of mathematical citation.

This can be viewed fully here:

```
// Algorithm that accepts the NP-complete language SUBSET-SUM.
//
// this is a polynomial-time algorithm if and only if P = NP.
//
// "Polynomial-time" means it returns "yes" in polynomial time when
// the answer should be "yes", and runs forever when it is "no".
//
// Input: S = a finite set of integers
// Output: "yes" if any subset of S adds up to 0.
// Runs forever with no output otherwise.
// Note: "Program number P" is the program obtained by
// writing the integer P in binary, then
// considering that string of bits to be a
// program. Every possible program can be
// generated this way, though most do nothing
// because of syntax errors.
FOR N = 1...∞
 FOR P = 1...N
  Run program number P for N steps with input S
  IF the program outputs a list of distinct integers
   AND the integers are all in S
   AND the integers sum to 0
```

```
 THEN
   OUTPUT "yes" and HALT
```

My full solution has been identified and solved in this manner in April 2011.

Next we have the Riemann Hypothesis which has been described as: Some numbers have the special property that they cannot be expressed as the product of two smaller numbers, e.g., 2, 3, 5, 7, etc. Such numbers are calledprime numbers, and they play an important role, both in pure mathematics and its applications. The distribution of such prime numbers among all natural numbers does not follow any regular pattern, however the German mathematician G.F.B. Riemann (1826 - 1866) observed that the frequency of prime numbers is very closely related to the behavior of an elaborate function

$\zeta(s) = 1 + 1/2s + 1/3s + 1/4s + \ldots$

called the Riemann Zeta function. The Riemann hypothesis asserts that allinteresting solutions of the

equation

$\zeta(s) = 0$

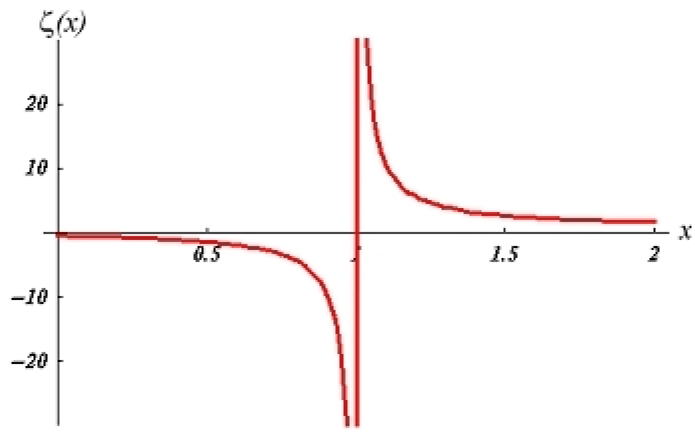
lie on a certain vertical straight line. This has been checked for the first 1,500,000,000 solutions. A proof that

it is true for every interesting solution would shed light on many of the mysteries surrounding the distribution

of prime numbers. First of all in my opinion, if Riemann is true then the Zeta function must then be infinite because it is a continuing frequency of prime numbers. Simple graphs has identified this as true as seen here:

Proven infinite and true as having both obvious and non obvious values in the numerical function. Also known as below zero and above zero. All the shown graphs are plotted correctly, coordinates with zero, and are in support of the Riemann Hypothesis of a Zeta function.

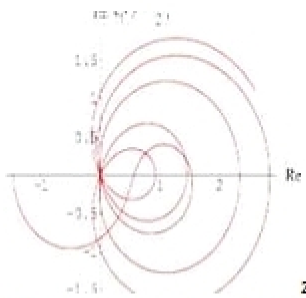
A double graph is an example of the possibility of both obvious and non obvious numerical values. It also shows its in coordinace with a straight vertical line passing through zero.



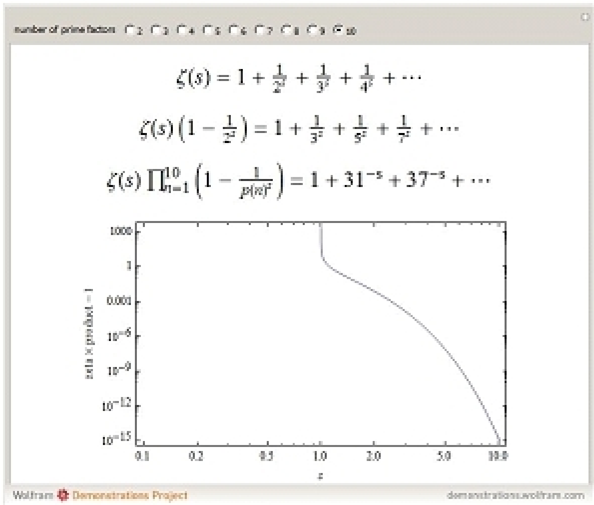
The Reinman Hypothesis states that the Zeta Function is vertical, this must be true logically, because the zeta function is infinite.

$\zeta(s) = 1 + 1/2^s + 1/3^s + 1/4^s + \ldots$

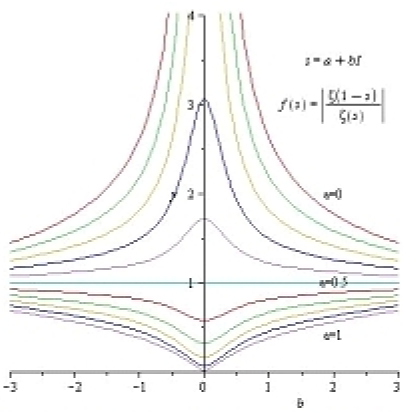
Means the the Zeta Function is infinite.



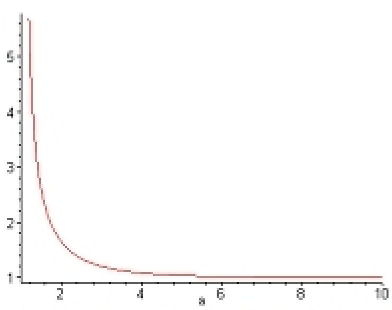
Zeta ends at 1+1/infinity's, which equals infinity so the ending functional value of Zeta is infinity. Obvious zeros and Non-Obvious zeros are the two catagories for the begining and of the function. However, you can't estimate and end because the Continuum of the functional equation. This means that my hypothesis of the Zeta function being infinite is correct, so Reinman's hypothesis is a meaningful representation of this data.



Look at the following above the prime factors keep continuing and will keep being in and out of the curve, meaning this is also another example of the idea that the Zeta Function has an infinite continuation, both datas, if correct as well as logically initiated, have proved my solution right.



This equation will have the object representation increases in size meaning the graph will infinitely increase, this graph also proves my idea that the zeta function is infinite.



Same example of a graph continuing and same example that the Zeta is infinite, and proven that both the obvious and non obvious values will also keep going on.

If my idea that these graphs are in correspond with my idea then this would also correspond with the Im(s)=T argument where there exists an imaginary part between 0 and T.

$$\frac{1}{\pi}\mathrm{Arg}(\Gamma(\tfrac{s}{2})\pi^{-s/2}s(s-1)/2) = \frac{T}{2\pi}\log\frac{T}{2\pi} - \frac{T}{2\pi} + 7/8 + O(1/T)$$

Sources:

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Andrew
Nassif
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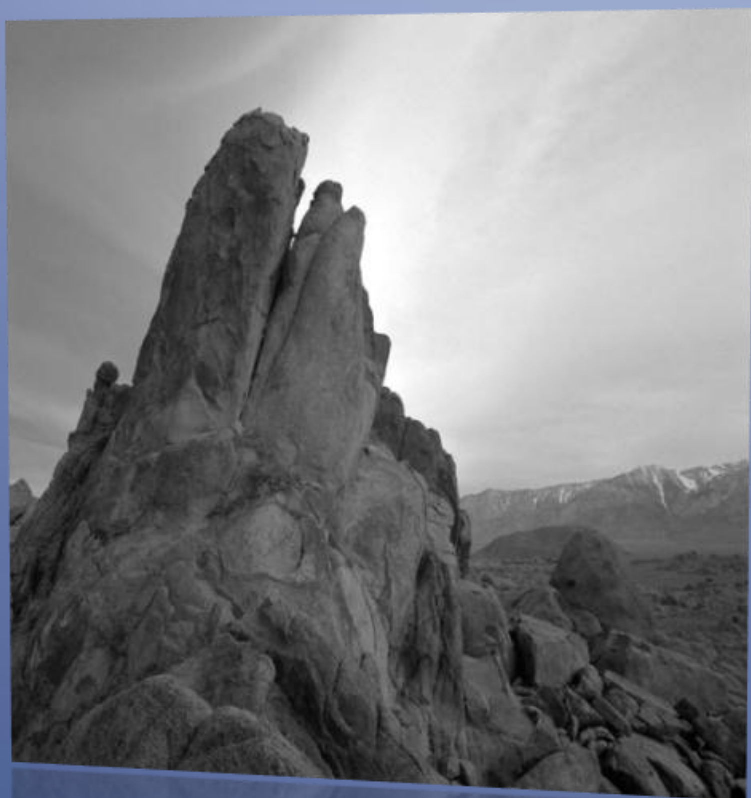
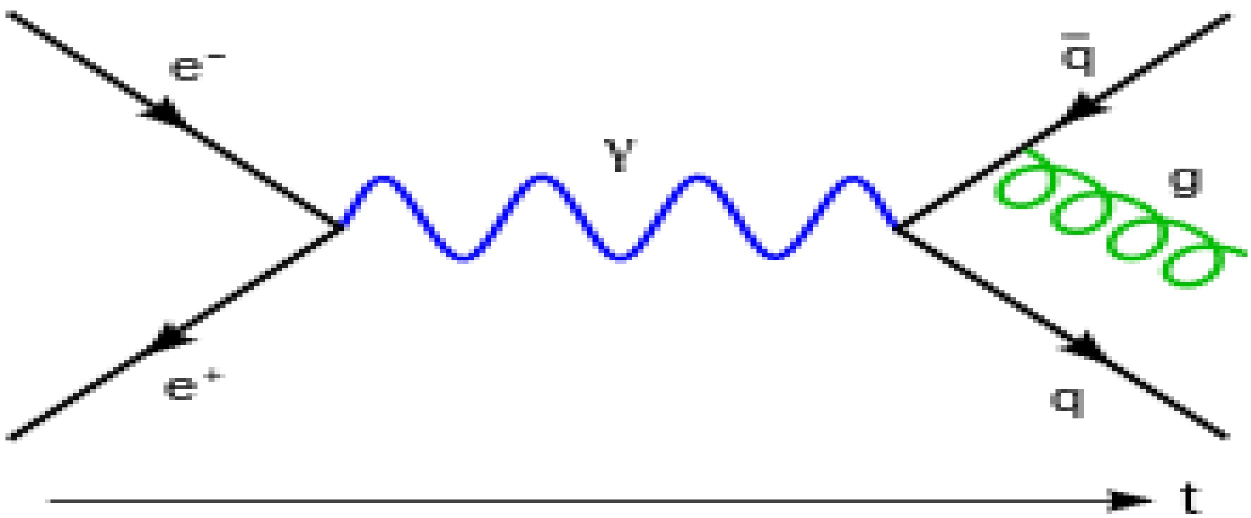


Quantum Field Theory

A Theoretical Framework

A research paper on some of the biggest controversies in the field of science and theoretical physics. This includes attempts on finding new scientific discoveries and research on the field itself as well as what is Quantum Field Theory.

Quantum Field Theory is the framework of all Quantum models in Quantum Physics and Theoretical Physics. It goes on the bases of having many bodies in the form of condensed matter. This helps us realize what we are made of, how the universe works, and what builds us up. These fundamentals are important in understanding the world around us, which is what science is meant to do. Particle Physics itself is revised by theories in Quantum Field Theory. This also sheds light on the area of both Quantum Mechanics and Elementary Physics. In the field Quanta there are ripples of matter and specs of atoms that make up this universe. These theories have been proved many times in history on the basis of Socrates Atomism Theory, Feynman's Diagram of Quantum Structures, Maxwell's Equation, The Multiverse Theory, General Relativity, and Alfred Morgan's Theory of Continuations in Fluid Mechanics. This belief in Quantum Field Theory also brings the belief on Gluons which are particles that exchange forces between Quarks in the Quantum model. Quarks are the constituents of matter that form hadrons when interacted between the forces of Gluons.



The Dirac Equation is written as: $$\left(\beta mc^2 + \sum_{k=1}^{3} \alpha_k p_k \, c\right) \psi(\mathbf{x},t) = i\hbar \frac{\partial \psi(\mathbf{x},t)}{\partial t}$$

- $\psi = \psi(\mathbf{x}, t)$ is a complex four-component field thought to be the wave function on an electron
- $\mathbf{x}$ and t are the coordinates of space and time,
- m is equal to the rest mass of an electron,
- p is momentum, which is the momentum operator in Schrödinger's theory,
- c is the speed of light, while the formation $\hbar = h/2\pi$ is reduced as Planck constant.

Modern Textbooks write the Dirac Equation as: $$\left(c\boldsymbol{\alpha} \cdot \mathbf{p} + \beta mc^2\right) \psi = i\hbar \frac{\partial \psi}{\partial t} \, .$$

However the way modern textbooks wrote Dirac's equation is an estimate on the real equation itself, not the actual value stated in Dirac's original equation. This makes the modern textbooks' version slightly less accurate.

Canonical Quantization in field theory is known to be the analogous to construction of Classical mechanics as compared to Quantum mechanics as well. The canonical function represents space and time and stays at a specific momentum controlled by gravity. This can lead to the theory of multiple derivatives in the measure of gravity depending on specific location, which matches as being proven by General Relativity. This can also result in a measuring of covariant results in Quantization which is measure of space and time in which it chooses a Hamiltonian structure. A Hamiltonian structure is known as the operator of energy in a Quantum System.

This can be viewed using the formation of Schrödinger's wave mechanics and a view of kinetic energy and momentum in the equation as follows: $\hat{T} = \frac{\hat{\mathbf{p}} \cdot \hat{\mathbf{p}}}{2m} = \frac{\hat{p}^2}{2m} = -\frac{\hbar^2}{2m}\nabla^2$,

which can then be formalized to:

$$\begin{aligned} \hat{H} &= \hat{T} + \hat{V} \\ &= \frac{\hat{\mathbf{p}} \cdot \hat{\mathbf{p}}}{2m} + V(\mathbf{r}, t) \\ &= -\frac{\hbar^2}{2m}\nabla^2 + V(\mathbf{r}, t) \end{aligned}$$

This is extended to N being the measurement with V being potential Energy and M denoting the mass of particles, and then this equation will be equal to:

$$\begin{aligned} \hat{H} &= \sum_{n=1}^{N} \hat{T}_n + V \\ &= \sum_{n=1}^{N} \frac{\hat{\mathbf{p}}_n \cdot \hat{\mathbf{p}}_n}{2m_n} + V(\mathbf{r}_1, \mathbf{r}_2 \cdots \mathbf{r}_N, t) \\ &= -\frac{\hbar^2}{2} \sum_{n=1}^{N} \frac{1}{m_n}\nabla_n^2 + V(\mathbf{r}_1, \mathbf{r}_2 \cdots \mathbf{r}_N, t) \end{aligned}$$

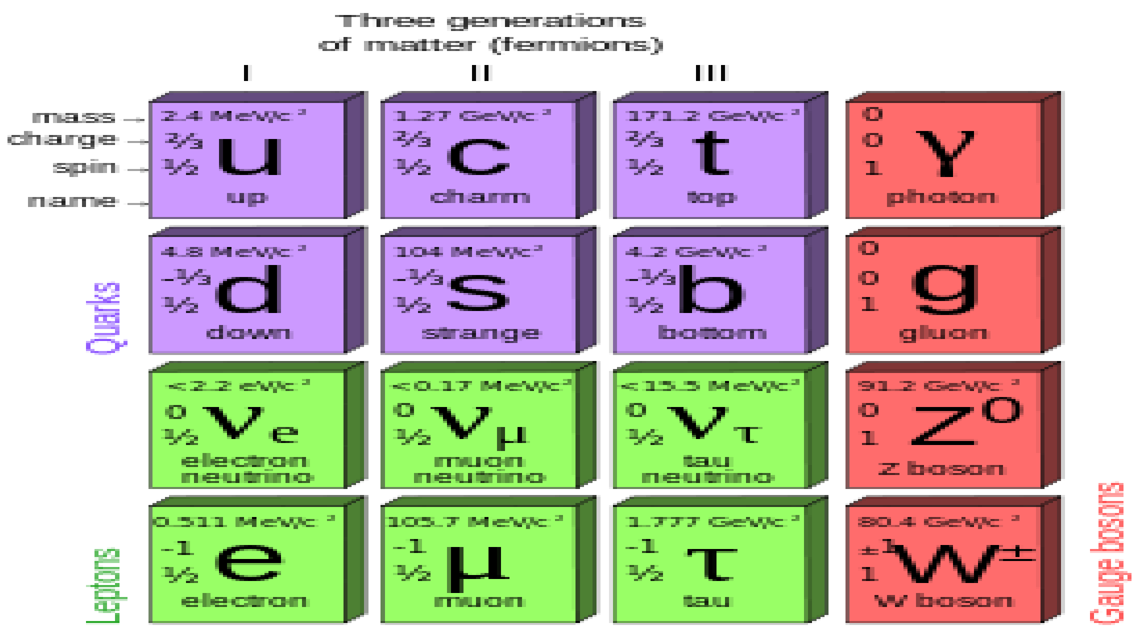
This means that for non-interacting particles then the equation is being represented as:

$$V = \sum_{i=1}^{N} V(\mathbf{r}_i, t) = V(\mathbf{r}_1, t) + V(\mathbf{r}_2, t) + \cdots + V(\mathbf{r}_N, t)$$

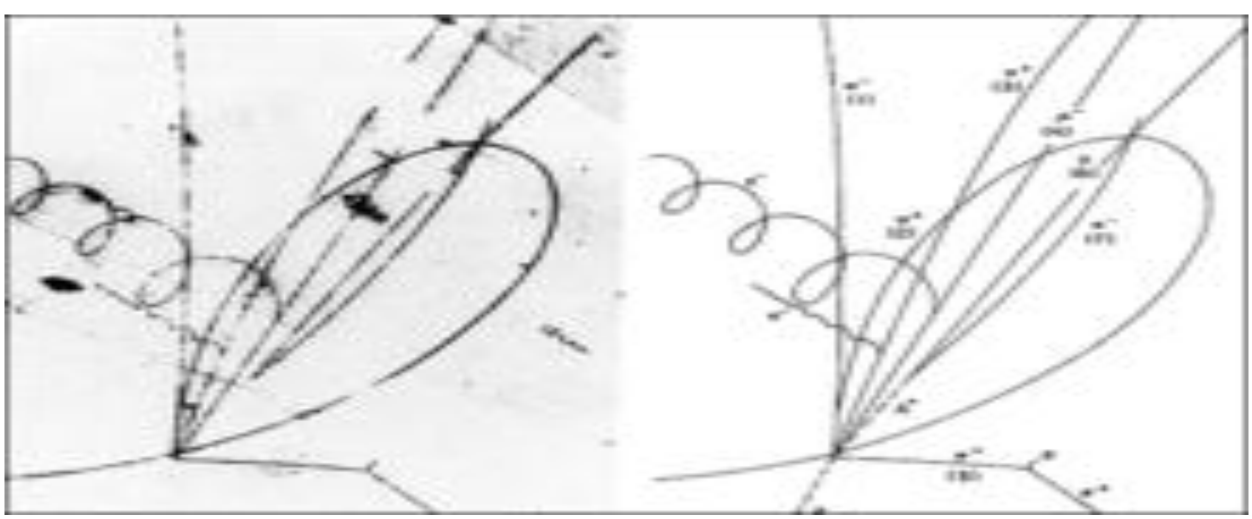
Schrödinger's measurement of space and time is then viewed as: $H\left|\psi(t)\right\rangle = i\hbar\frac{\partial}{\partial t}\left|\psi(t)\right\rangle .$

which in Dirac's formulation as measure of eigenvectors denoting at a in the spectrum of energy levels being allowed, the equation can then be viewed as: $H\left|a\right\rangle = E_a\left|a\right\rangle .$

As I mentioned earlier, Quarks are the constituents of matter. They can be viewed by various properties including electric charge, color change, mass, spin of energy, and exchange between particles. Quarks are considered elementary particles in the standard model of Quantum Physics which can view them as a different type of operator in condensed matter. Operator meaning source in this occasion; Quarks are also Fermionic meaning their measured by the sub classification of Fermi. Thus the classification of Fermi in particle physics can then be built up into three generations of matter. This will then provide a general understanding in the fundamentals of the field. For example Neutrinos are extremely light sub atomics particles which can often be found in extremely light elements such as helium.



These fundamentals led to the discovery of baryon as seen here:



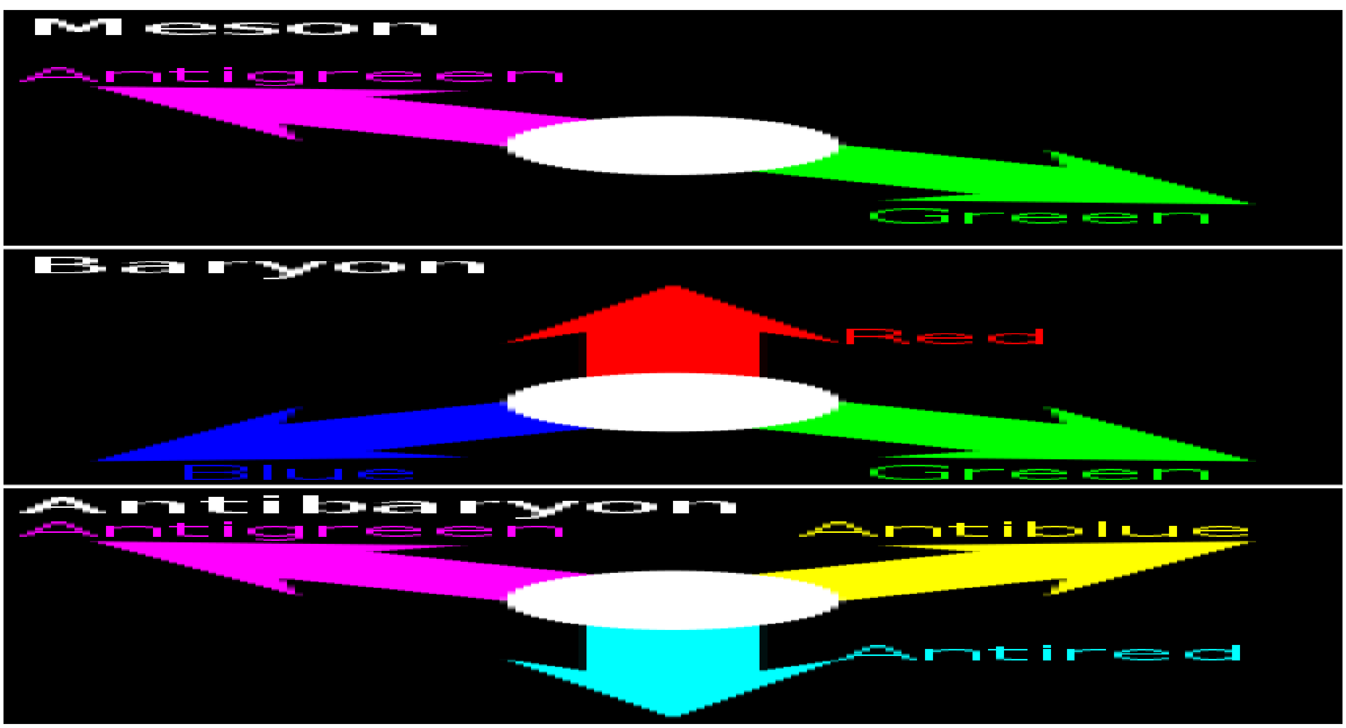
Next we look at the Quark Flavor Properties seen such as:

Quark flavor properties[67]

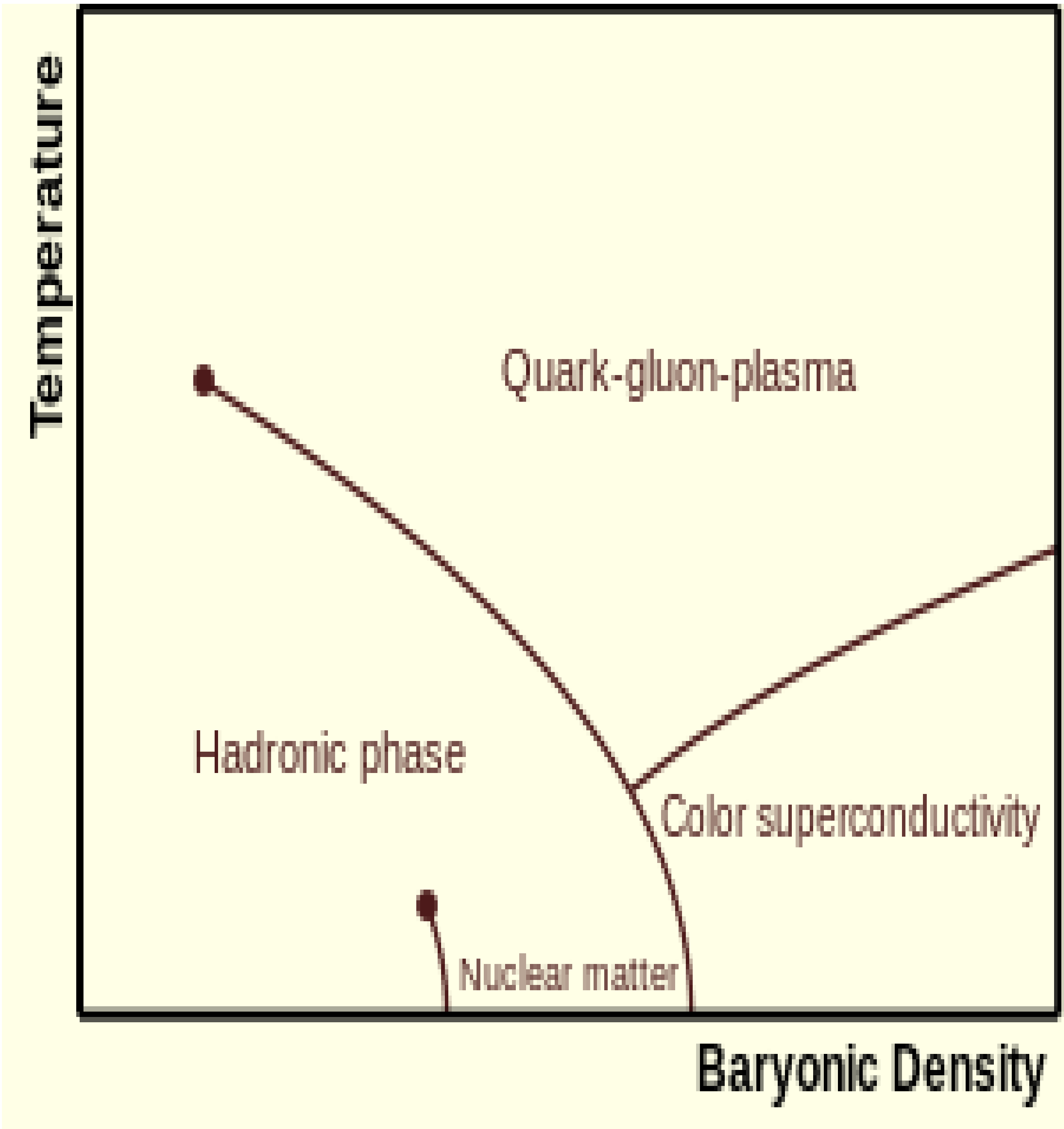
Name	Symbol	Mass (MeV/c^2)*	*J*	*B*	*Q*	I_3	*C*	*S*	*T*	*B′*	Antiparticle	Antiparticle symbol
First generation												
Up	u	1.7 to 3.1	$\frac{1}{2}$	$+\frac{1}{3}$	$+\frac{2}{3}$	$+\frac{1}{2}$	0	0	0	0	Antiup	u
Down	d	4.1 to 5.7	$\frac{1}{2}$	$+\frac{1}{3}$	$-\frac{1}{3}$	$-\frac{1}{2}$	0	0	0	0	Antidown	d
Second generation												
Charm	c	$1{,}290^{+50}_{-110}$	$\frac{1}{2}$	$+\frac{1}{3}$	$+\frac{2}{3}$	0	+1	0	0	0	Anticharm	c
Strange	s	100^{+30}_{-20}	$\frac{1}{2}$	$+\frac{1}{3}$	$-\frac{1}{3}$	0	0	−1	0	0	Antistrange	s
Third generation												
Top	t	172,900±600 ± 900	$\frac{1}{2}$	$+\frac{1}{3}$	$+\frac{2}{3}$	0	0	0	+1	0	Antitop	t
Bottom	b	$4{,}190^{+180}_{-60}$	$\frac{1}{2}$	$+\frac{1}{3}$	$-\frac{1}{3}$	0	0	0	0	−1	Antibottom	b

J = total angular momentum, *B* = baryon number, *Q* = electric charge, I_3 = isospin, *C* = charm, *S* = strangeness, *T* = topness, *B′* = botto

We can include that if there is an antibottom then there must be an Antibaryon as well as positive mesons and Baryons as seen on the graphs.



Conclusion: This then can lead to the possibility of neutrinos or toas being extremely light enough that they may have less mass or matter condemned in them then light itself, which can lead to the discovery of their being sub atomic particles faster than the speed of light itself. However if that is true, these equations may steel remain correct.



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The P vs. NP Problem Graphed

By
Andrew Magdy Kamal

Part I:
The P vs NP problem-
The question is to find the number of possible combinations of 400 students sitting down in 4 rows minus a list of 100 students not aloud-
P equals in parentheses 100 factorial possibilities times 4, then that result minus 100 factorial possibilities representing the possibilities of students not aloud-
Next Step: the total answer for the whole problem is (400!)-[100!*3] possibilities; p=np and n=1, while p is the # of possibilities

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GRAPHED IN 4D COLORIZED IMAGE: