

Undecidability, Uncomputability, and Unpredictability

or how Science has run into the Q-problem

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Abstract

This paper is written for the “Undecidability, Uncomputability, and Unpredictability Essay Contest” taking place at fqxi.org. Discussed are various candidate cases for having such problems.

The model of reality called “classical science” is deterministic within the model. If it would be indeterministic, then e.g. the Navier-Stokes equations would have such property. But latter is not discovered yet. The quantum science consists of two fundamental notions: observer and nature, and how they co-relate. Yes, the indeterminism comes into reality through freewill of observer, but the nature itself -which is subject of Physics- is perfectly deterministic even while talking about Quantum Physics; only the measurement as the act of freewill is the place for Unpredictability.

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I. ON UNDECIDABILITY, UNCOMPUTABILITY, AND UNPREDICTABILITY OF NATURE

I do not understand how problems or hypotheses known in pure mathematics like Undecidability, Uncomputability, and Unpredictability can happen to appear in the contemporary theories of Physics, [an example is the Navier-Stokes equations which is proclaimed as a Millennium Prize Problem] because of the following consideration: suppose that the formulas do not contain mathematical singularities, then one must be sure that after a non-zero interval dt the infinitesimally narrow initial conditions (e.g. the initial velocity of the fluid tending to 5 meters/sec with nearly zero error range) result in an infinitesimally narrow final result (e.g. the velocity of the fluid at $t_1 = t_0 + dt$ tends to 6 meters/sec with a nearly zero error range). In this case dt has in fact no lower limit because one can consider the next moment of evolution $t_2 = t_1 + dt$, as dt is not zero and is added with the same (velocity) consideration, and so on.

However, mathematical singularities exist in physics, like the singularity of the Schwarzschild spacetime at the event horizon which has to be the reason behind the Information Loss Paradox, as the mathematical form $1/(1 - 2M/r)$ of the metric component makes the event horizon $r = 2M$ a special place. Therefore, the question of Undecidability, Uncomputability, and Unpredictability remains at the boundary of Science. Therefore, in the next subsection I study the natural boundary of our reality called black hole.

A. Problem with the first photography of a Black Hole

As shown by Laura Mersini-Houghton, Hawking radiation can stop a star collapse, so there are bodies that are larger than the Schwarzschild sphere but smaller than the neutron star [9]. I offer the following solution to solve the discrepancies between the results of Refs. [12] and [11]: the ergosphere is the surface of the Absolute Nothingness (called simply “object” in the following). In that way, we avoid having (hypothetical) negative energy particles in the “Penrose energy extraction process” [8] inside the ergosphere, and we are getting rid of the Hawking information loss paradox at the “bottom” of the ergosphere, i.e., at the event horizon. Is expected then that such an object is the black hole in the middle of the galaxy M87.

Then not the event horizon is being black but the ergosphere. If the surface of the object is the ergosphere, we can notice that the speed of any falling matter is the speed of light just on the surface of the object (measured by a stationary observer [10]). I have calculated this speed using Ref. [8]. Therefore, there is an effective red-shift, and the surface of the object must be black. Indeed, by the definition of the ergosphere surface, one has $g_{tt} = 0$ on this surface, and the metric for stationary observer (with $d\phi = d\theta = dr = 0$) just at the surface reads $d\tau^2 = g_{tt} dt^2$, which looks exactly like the cause for the infinite red-shift turning the black hole to “black”.

The Event Horizon Telescope Collaboration judges the mass of the black hole by the size of the black spot in the sky (they called it “shadow”). But if the ergosphere is black, not the event horizon (because the latter is absent for an object with ergosphere surface), then judging by the size of the black spot, the mass of the “extremal” black hole will be two times smaller than reported by the Event Horizon Telescope Collaboration, as the radius of the ergosphere is two times larger than the event horizon, $r_E = 2r_h$. As a consequence, the mass value $m = 6.5 \pm 0.2 \pm 0.7$ billion solar masses, as reported by the event horizon Telescope Collaboration [11], can be divided by a factor of two to produce the correct mass $M = m/2 = 3.25 \pm 0.1 \pm 0.35$. Therefore,

$$3.25 - 0.1 - 0.35 = 2.8 < M < 3.7 = 3.25 + 0.1 + 0.35.$$

This range perfectly agrees with the previous most recent mass determination [12], which was

$$2.8 < M < 4.4.$$

Note that the precision of our instruments has noticeably grown over the years, $3.7 < 4.4$.

So again, the Event Horizon Telescope Collaboration reports the mass m of the black hole by measuring the PROPER (not the “visible”) size ψ of the black spot in the middle of the Galaxy M87 by the formula $m = \psi$ in meters. However, the author has shown evidently that the proper size of the black spot is related to the true mass M with $\psi = 2M$ for the “extremal” black hole. As the telescope sees the black not at the event-horizon $r_h = M$ but at the ergosphere $r_E = 2M$, one has $M = m/2$. The author suggests to rename the Event Horizon Telescope into “Ergosphere Telescope”.

II. BOUNDARY WITH SPIRITUALITY

The boundary with Science reminds to the boundary with Spirituality, e.g. to consciousness and freewill. It is argued that Science has to cooperate with religion. Yes, there are many religions, but they share at least one common truth, which is: “God’s Name is God.” Holy water is water that has been blessed by a member of the clergy or a religious figure. The use for cleansing prior to a baptism and spiritual cleansing is common in several religions, from Christianity to Sikhism. The use of holy water as a sacramental for protection against evil is common among Lutherans, Anglicans, Roman Catholics, and Eastern Christians [1].

A demon is a supernatural being, typically associated with evil, prevalent historically in religion, occultism, literature, fiction, mythology, folklore as well as in media such as comics, video games, movies and television series.

The Q is a fictional character as well as the name of a race in Star Trek appearing in the Next Generation, Deep Space Nine, and Voyager series, as well as in related media. The most familiar Q is portrayed by John de Lancie. He is an extra-dimensional being of unknown origin who possesses immeasurable power over time, space, the laws of physics, and even reality, being capable of altering it to his whim. Despite his vast knowledge and experience spanning untold eons (and much to the exasperation of the object(s) of his obsession), he is not above practical jokes for his own personal amusement, for a Machiavellian and manipulative purpose, or to prove a point. He is said to be almost omnipotent, and he is continually evasive regarding his true motivations. The film theory says that “if Q is not from God, he is a demon.”

Therefore, holy water is needed to perform cleansing of scientific facilities, to drive out demons from Science. However, Science refuses to collaborate with priests because of the pride called “scientific secularism”.

Secularism, as defined in the Merriam-Webster dictionary, is “indifference to, or rejection or exclusion of, religion and religious considerations”. In certain contexts, the word can connote anticlericalism, atheism, desire to exclude religion from social activities or civic affairs, banishment of religious symbols from the public sphere, state neutrality toward religion, the separation of religion from state, or disestablishment (separation of church and state). As a philosophy, secularism seeks to interpret life on principles taken solely from the material world, without recourse to religion. Secularism draws its intellectual roots

from Greek and Roman philosophers such as Zeno of Citium and Marcus Aurelius; from Enlightenment thinkers such as John Locke, Denis Diderot, Voltaire, Baruch Spinoza, James Madison, Thomas Jefferson, and Thomas Paine; and from more recent freethinkers and atheists such as Matthew W. Dillahunty, Robert Ingersoll, Bertrand Russell, and Christopher Hitchens. It shifts the focus from religion to other “temporal” and “this-worldly” things, with emphasis on nature, reason, science, and development. Now, we are able to put these all together as “Science has run into the Q-problem.”

III. EVIDENCE FOR THE Q-PROBLEM

We give a proof that the demon or “alien” Q is not fictional at all, because of his mess up with experiments. This mess up is reported with confidence level over 5 sigma!

A. Sterile neutrinos

Scientists have produced the firmest evidence yet of so-called sterile neutrinos, mysterious particles that pass through matter without interacting with it at all. The first hints for these elusive particles turned up decades ago. But after years of dedicated searches, scientists have been unable to find any other evidence for them, with many experiments contradicting those old results. These new results now leave scientists with two robust experiments that seem to demonstrate the existence of sterile neutrinos, even as other experiments continue to suggest sterile neutrinos don’t exist at all. That means there’s something strange happening in the universe that is making humanity’s most cutting-edge physics experiments contradict one another [2].

B. Proton radius puzzle

As a second example, the proton radius measured by many experimenters was different in different years. This riddle did not find yet a solution [3]. I personally would solve this problem with an insertion of Ψ “by hand” into the radius value, $r = R + \Psi$. The proton radius puzzle is an unanswered problem in physics related to the size of the proton [4]. Historically, the proton charge radius was measured by two independent methods which

converged to a value of about 0.877 femtometres. This value was challenged by a 2010 experiment using a third method which produced a radius about 4% smaller than this, at 0.842 femtometres [5]. New experimental results reported in the fall of 2019 agree with the smaller measurement, and it has been proposed that the puzzle is now solved [6]. However, this opinion is not yet common [3].

C. Newton's gravitational constant G

As third example, a controversial 2015 study of some previous measurements of the gravitational constant by Anderson et al. suggested that most of the mutually exclusive values in high-precision measurements can be explained by a periodic variation of this "constant" [7].

D. Dark Matter as invisible matter

Matter is defined to be invisible if it does not interact with visible matter (e.g. with baryonic matter). Being invisible is surely a subject of this Essay. Hereby, the gravitational interaction cannot be called a true interaction, because according to Albert Einstein the gravity is not a force. The examples of invisible matter are the sterile neutrino and the demon Q. Reality works on proper definitions and on the correct use of words. This is due to the First Law of Aristotle's Logic. Therefore, if gravity cannot be called a force, this is important to get to know about reality.

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