

The Secret Life and Role of the Neutrino

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Abstract

The identity of the neutrino as the particle of consciousness and its role in that capacity as the universal information carrier and transmitter are explained in this paper. Facts about neutrino release from black holes, their ubiquitous presence and incredible numbers, the role of the conscious observer in quantum mechanics, and the new theory of neutrino condensates are integrated to reveal the critical messenger role they play in the formation and evolution of the universe. The primacy of consciousness to a comprehensive Grand Theory of Everything is also pointed out.

Introduction

Let us begin with seven basic facts about the neutrino:

1. There are some 65 billion solar neutrinos coursing merrily through every square centimeter surface of our body and everywhere else on earth every second, continuously, constantly, and unstoppably. [1]
2. They oscillate between electron, tau and muon neutrino states. [1]
3. The average density of *relic neutrinos*, which form the Cosmic Neutrino Background (CνB) cloud left over from the big bang singularity of 13.7 billion years ago, is 56 of each type of neutrino per cubic centimeter all across the universe. [1]
4. Outbursts of solar neutrinos are correlated with changes in the half-life decay constant of radioactive isotopes. [2]
5. As a supernova is collapsing into a black hole, *“the star could release 99 percent of its final energy in the form of neutrinos.”* [3]
6. *“Neutrinos can pass through matter almost unhindered. For typical neutrinos produced in the sun (with energies of a few MeV), it would take approximately one light year of lead to block half of them.”* [1]
7. Neutrinos are chargeless, almost massless, and travel close to the speed of light. They are notorious in both laboratory and limerick for being ever so elusive and for apparently arriving before they are due.

Holding these facts in mind collectively, as also the black hole information-loss paradox (BHIP) — *What happens to the information that is lost as objects are sucked into the mega-gravity of a black hole?* [4] -- I will first explore a few topics which stretch the limits of our understanding in physics, and from these frontier outposts point to what lies across the boundary, and in particular explain the vital and so-far unknown dual role of the neutrino.

Where Does Energy Come From?

One of the fundamental tenets of physics is the law of conservation of mass-energy, enshrined in Einstein's $E=mc^2$ equation. Matter and energy in total can be neither created nor destroyed, but can be converted from one form to another, as also between mass to energy and vice versa. We take the universe as a given with regard to energy. We do not know where it came from or where it will end, but take it for granted that energy is somehow "there" always and abundantly in the quantum vacuum, and is particularly manifest at some singularity such as the big bang as radiation, after which it spawns matter and then various entities such as galaxies, stars, planets, plants, animals, and human beings. The domain of physics to date has been the study of particles and waves, fields and probabilities, matter and energy, and their space-time transformations through forces and interactions of various kinds. *All is predicated on the fact of energy being a primordially available 'resource' out of which matter and all else can then be derived in practice, and explained in theory.*

This brings us to a foundational question: *Where does the energy of the universe come from or out of?* If matter/energy is always conserved, and there seems to be an infinite supply of it all the time, what is its original source? *Where does this energy reside when it is unmanifest and beyond the sensorial probes of the physicists?*

The Curious Business of Consciousness

Next, let us ponder the philosophical implications of quantum mechanics, in particular the requirement of the theory that a conscious observer is necessary to collapse the probability wave function that will manifest the outcome of a measurement. In other words, this means that a witness is necessary for phenomena to materialize; and going further, the presence of the observer and the kind of measurement that is being made drives the behavior of observed particles or waves in particular ways.

This entanglement of the observer and the observation means that there is no cold objective reality out there independent of a sentient witness. Einstein's formulation of the laws of physics being invariant across various frames of reference only begs the question – **Who** is defining and measuring at these frames, typically represented graphically by the xyz and t axes? The rational, objective, empirical, intellect-driven physicist, of either theoretical or experimental persuasion, hits a wall at this juncture while sitting at the zero of some coordinate system. The notion of a conscious observer, and in fact this whole funny business of consciousness, is anathema to them, even though they keep bumping up against its ghosts in their innermost moments. Objective, measurable, empirical reality is the only reality for them, one that they can grasp with their senses and instruments. The central question of the observer, the witness, the consciousness behind the phenomena of their probing is as yet beyond their ability to grasp or conceive, visualize or localize or equationalize.

Further, consciousness reeks too much of spirituality and other 'mystical' stuff, and seems to be the plaything of sages in caves, and perhaps for this reason alone most physicists have so far stayed away from bringing it into their Grand Unified Theories of Everything. In this regard, note that if there is no stellar and central role for consciousness in any theory of the universe claiming to be the ultimate or grandest of them all, it will be an instant non-starter for that grand title, and may be said to cover only the left toe of the totality of reality.

Consciousness Is the Ultimate Timeless Reality

With that prelude, let it be now postulated from a scientific perspective, and revealed from spiritual intuition, that **Consciousness is the ultimate, eternal, and essential ground and reality of the universe.** Consciousness always has been, is, and will be, such is its nature. It is primal and primary, the causeless cause of all else, and the silent witness of the world's panorama. Consciousness is awareness without any subject-object duality, and it is all-pervading and all-illuminating while also being always invisible. It is our innermost sense of being simply aware, without any object or thought occupying the content of the awareness. Consciousness is what bursts the quantum probability bubble to manifest a measurable real-world outcome.

Space is a construct in and time is an artifact of consciousness, and since universes are strung in space with the thread of time, we must all learn to

appreciate that we are already and always, totally and automatically immersed in and surrounded by consciousness. Our relationship vis a vis consciousness is as follows – we are *in* consciousness wherever we go, and it is also the silent inner witness, in each of us, to our goings and comings within its folds.

This universal consciousness is continuously pervasive and unavoidably present all over the cosmos. It involves itself and then plays hide and seek through sentient forms, such as us, registering as our innermost sense of identity beyond all our mind-body associations, and eventually evolves over many cycles of physical life and death to recognize itself in a state of supramental knowledge. The recognizing entity -- the real Self in us -- realizes its true nature as a fractal hologram of the universal consciousness in that state.

How to Know Consciousness?

This state of direct knowledge by inner experience and spiritual intuition, variously called Self-realization, enlightenment, satori, samadhi, nirvana, zen, moksha, and so on in the wisdom traditions that care to delve into these matters, is accessible to trained and diligent practitioners of the arts of yoga, meditation, and other inward-turning disciplines. When by their practice the mind is supercooled to stillness and silence, a transcendent state is reached in which consciousness reveals itself spontaneously.

It is worth pointing out that consciousness, ***the ultimate subject*** as I-ness or awareness, cannot ever be objectified; therefore it is not amenable to being known in its essence through any external probes or proofs, EEGs or fMRI scans, nor through the highest intellection or deepest debate, nor through the greatest analysis or brightest reductionism, and not even through religious faith or virtuous living by themselves. Only direct, immediate, personal awakening into our essential eternal nature can teach us what consciousness really is.

And in particular, the experiential knowledge of consciousness makes it obvious to the awakened subject that there is no need to ask the otherwise inevitable infinite regression question: *“What was there before this consciousness and what did it come out of?”* For the dawn of this knowledge makes it self-evidently clear that *beyond consciousness there is nothing*, that *before consciousness is an impossibility to conceive*, and that therefore ***all there is is consciousness, forever and always***. It is the only game in town, so to speak, in this case the town being the entire universe. Or perhaps, we

should say more correctly that the whole universe is a game of, and in, consciousness!

Consciousness and Energy: The Integral Duo Evolving the Universe

We are now coming close to the answers we seek. This infinite eternal all-pervasive consciousness, which can be directly known by the means pointed out above, has inherent within it, and as indivisibly integral to its immaterial wholeness, ***an infinite plenum of energy*** which manifests periodically out of its quantum vacuum all the material phenomena of nature, from universes and galaxies to bosons and neutrinos, with planets and people given a place in the play somewhere in between. As waves and foam are vibrated out of the still ocean, so are universes pulsated out of consciousness by its intrinsic energy. With this insight, we can now assert that ***the energy of the universe eternally abides in and occasionally vibrates out of the dimensionless field of timeless consciousness.***

The universe is further to be understood as a play of involution followed by evolution, as an arcade of cosmic hide and seek. Consciousness first gets *involved*, or hides, in its manifesting energy and then evolves out of it through various forms to discover itself in the self-aware human being. Our energetic aspect is our body, including the mind and its operations, and the conscious aspect of our being is the abiding witness, the pure awareness without an object. In the unitary experience, energy is dissolved into the unmanifest and the primal essence of pure consciousness is realized.

The Secret Life of the Neutrino

From the facts and insights presented thus far about the neutrino, and on the nature and evolution of consciousness and energy, the image should be emergent that we live in a sea, a web, an invisible all-pervasive dust cloud of this universally abundant particle. We are immersed in swarms and swirls and jets of it all the time, to the tune of 65 billion per second per square centimeter through each of us from the Sun alone, and 56 per cc as relic neutrinos all across the cosmos. While neutrino astronomers are interested in its mysteries primarily for *what it can reveal about where it came from*, the thought has not struck them yet to ask: “*What the heck are these ever-present, elusive, infinitely swarming, wispy particles doing all across the universe?*” In other words, *does*

the humble neutrino have a secret life beyond its physical day job, which is to conserve angular momentum in elementary particle reactions?

The astonishing answer staring us in the face -- in view of the copious black hole emissions of neutrinos, as just one datum, coupled with all the fuss about BHIP -- is that *it is these blessed particles that are carrying away information* from the stars and other systems imploding in the suctioning spirals of hyper-gravity all around them. Not only is 99% of the energy of a collapsing star packed off with the neutrinos before the final implosion, **but also 100% of the information** *that was ever there in that region of space-time is also being piggy-backed on these messenger mules*, for deployment elsewhere in the universe through their agency, now or in future.

We are now ready for the first revelation about the secret life of the neutrino. ***The real mission of the neutrino is the capturing, carrying, and delivery of information across infinite space and eternal time.*** It is the primary data capsule or packet of cosmic information. As the go-and-deliver-everywhere courier of interstellar space, it scans and captures, and carries and delivers information from anywhere to anywhere. It influences or changes or switches both source and receiving objects through appropriate physical interactions as it zips past them. Carrying away information from black holes is only a special case of its more expansive role as cosmic messenger and data courier.

In the process of carrying and delivering information, picking up and exchanging data bits, or switching trigger circuits in galaxies or glial cells on or off, the neutrino oscillates between three states due to a change in the information content after each exchange. Every signal it carries or switch it activates -- be it to a proton or in a neuron, to a protein or in a neutron star -- is just in time, just as needed, and precisely addressed to influence the operation or evolution of that entity in some fashion, either at that moment or at some later point in its history. As an example of how this works, if certain isotopes on earth are to decay a tad faster or slower, the information to induce this change in their radioactivity is transmitted by solar neutrinos of the right flux and flavor mix passing through those specimens a few minutes earlier. [3]

We have set the stage now to ask the million dollar question: *What qualifies the neutrino for this role as a cosmic messenger?*

The Neutrino: The Particle of Consciousness

The answer is our second major insight into the neutrino's life: ***The neutrino is born to this status as the first barely massive evolute, the first and subtlest trace of particle-ar wriggling or scintillation or shimmering in the unitary field of consciousness.*** The barest of energy is expended from the cosmic storehouse to manifest the neutrino, since to conduct information in the theoretical limit requires no mass. Hence its proverbial elusiveness, almost masslessness, and close to c speeds.

As a Gedanken exercise to process all this, imagine a perfectly still ocean of undivided oneness in which suddenly some strobe-light flashing makes it possible for us to see with our naked eyes and with great resolution *every single drop of water* and all the molecules jiggling around in vivid Brownian motion. Now switch from the ocean of water to the infinite canvas of consciousness and in place of the water drops visualize gazillions of streaming, grinning neutrinos endlessly zooming all around you and all over the universe. With this new perspective, we arrive at the third and most important discovery of this essay: ***The neutrino is the primary particle of consciousness.***

To establish the connection between this identity and its cosmic messenger role, we have to now ask another fundamental linking question: *How is information related to consciousness?*

Information is an Artifact of Consciousness

To answer this question, let us now add another key insight. ***The mind, which is the ultimate container and processor of information, is the reflection of consciousness in our body, operating via the brain.*** All knowledge, all ideas and information, emotions and feelings, thoughts and memories, themes and memes, all that we may call *software* of some kind or another have no existence or meaning in the absence of a sentient mind to recognize, process, and use them for some purpose. *There can be no information without a mind to be in-formed by it.* Data, be it on a scrap of paper or an LED panel, remains meaningless data and is of no use or interest to us if it is in a language we do not read. It is just ink or pixels until a sentient being sees a pattern or recognizes the alphabet and makes sense of it.

No matter how many petabytes of data we put on huge supercomputers and churn around with any number of sophisticated tools for analysis or modeling or simulation, and no matter even if all kinds of automated actions are implemented in the real world by systems operating on all this, *no re-cognition*

of information has taken place during all this data processing if no human mind has registered some kind of *meaning* at some point. And mind presupposes consciousness, since there can be no reflection without an original source. So we can conclude that ***the ultimate repository or ground of information is consciousness.*** And as the first evolute or particle, or *particular-ization* of consciousness, the neutrino becomes, naturally by birth and design, the carrier of information from that universal source as its local messenger agent.

Stephen Hawking, the doyen of BHIP, famously reversed his earlier position and lost a bet in admitting that information cannot be lost even in the all-gobbling core of a black hole. [4] All the information in the universe is preserved and conserved in the consciousness that is always already there everywhere to contain it in its pervasive totality as such, before and after all black holes and other beginnings and endings. From this unmanifest plenum or field, primordial *unstruck sound vibrations pulsate the neutrinos out* as its first particle-like condensates or evolutes, even before photons or electrons or bosons are manifest down the energy to matter food-chain. Therefore it is that we identify the neutrino ***as the first particle to emerge out of the unitary field of consciousness.***

We have established thus a schema of evolution from consciousness to neutrino to energy and matter, life and mind and then back to the source. Understanding the role of the neutrino as the information carrier of the universe opens up a world of astonishing discoveries and possibilities, both for physicists and for those interested in the pursuit of consciousness.

We will conclude this essay with a theory proposed recently by FQXi Awardee Stephon Alexander of a *neutrino condensate* that may predate the big bang, with the astonishing punch line that “*our universe might actually have formed in the neutrino soup housed inside a black hole.*” [5] If so, we now know that all the initial information for the production of our universe came from that black hole. Ancient information from that soup and current impulses from solar neutrinos are constantly impacting our existence and evolution. No matter whether they come from the sun, or from the black hole at the center of our Milky Way galaxy, or from any other source, and irrespective of the physical processes that led to their formation, we should now be able to see ourselves as fully immersed in and shaped by this teeming cloud of cosmic couriers.

Such is the secret dual life of the neutrino -- as a barely physical particle it conserves energy, and as the cosmic courier of consciousness it conserves and transmits information tirelessly across the universe.

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