A Neoclassical Model of Nature

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1. INTRODUCTION

A neoclassical model of nature is proposed, based upon two equal and opposite fundamental particles. These particles may also be considered as conserved excitations.

This model is derived from thought experiment and re-interpretation of modern physics and cosmology.

2. MODEL FOUNDATION AND CONJECTURE

The model is described affirmatively as conjecture. Where interpretations differ from modern physics and cosmology, the mapping is explored, and a foundation is established for further study.

2.1. Electrinos and Positrinos

The model is based on two oppositely charged electromagnetic particles, the **electrino** ε- and **positrino** ε+, each with |1/6| charge. These Planck scale indestructible particles carry energy and compose both standard model particles and a universe permeating superfluid gas of particles (possibly axion-like particles) that implements spacetime. At extremely high energy, both standard matter and superfluid spacetime gas decompose into a plasma of electrinos and positrinos. In reactions, superfluid spacetime gas particles decay into standard matter.

2.2. Electrino/Positrino Plasma Emits/Jets from Black Holes

In a black hole of sufficient energy and conditions, such as an active galactic center SMBH, ε- and ε+ particles are the decomposition products of high energy decay of matter-energy. At very high energy, ε- and ε+ form a Planck core. A Planck core is the highest energy state of matter with each ε- and ε+ particles carrying the Planck energy. When a Planck core breaches the event horizon, typically at the poles of a spinning SMBH, Planck plasma emits via jets from each AGN SMBH. Catastrophic breaches are also possible, typically in collisions between combinations of SMBH, black holes, and neutron stars.

2.3. Plasma Decays to Standard Model Particles

As ε- and ε+ plasma, in AGN SMBH emissions or jets, decays via conservative transactions, clusters of ε- and ε+ particles combine to become standard model matter-energy particles. The mapping of ε- and ε+ to key standard model particles is as follows: neutrino 3ε-/3ε+, electron 6ε-/, up quark 1ε-/5ε+, down quark 4ε-/2ε+, neutron 9ε-/9ε+, proton 6ε-/12ε+.

2.4. Plasma Cools and Forms a Universe Permeating Gas

As ε- and ε+ plasma cools, it clusters into composite particles of spacetime with a 6ε-/6ε+ formula, and a spherical orbital structure. Spacetime gas has characteristics of a superfluid. The superfluid gas creates the spacetime characteristics of general relativity and is the superfluid aether underlying quantum mechanics (aka quantum vacuum) and is the carrier of electromagnetic and gravitational waves.

2.5. Gravitational Wave Energy Heats the Superfluid Gas

Matter-energy interacts electromagnetically with local spacetime gas to exchange gravitational waves, which spread spherically through the superfluid at the local speed of light. This "mass" energy of the continuously refreshed gravitational wave heats the spacetime gas. The local temperature (energy) gradient of the gas causes a convective force on standard matter-energy, aka the force of gravity.

2.6. Physics Parameters Run with Gas Temperature (Energy)

Elevated spacetime gas temperature (energy) increases its permittivity ε and permeability μ, reducing local speed of light, and causing refraction commonly attributed to curved spacetime "lensing" around dense matter. Increasing permittivity and permeability influence spacetime gas and standard matter electromagnetics, resulting in matter contraction and time dilation as described by general relativity. Physics "constants," also including the fine structure value, can be understood as the low temperature asymptote of these variables.

2.7. Quantum Mechanics

Quantum mechanics describes interactions of standard matter, without describing ε- and ε+ and their role in spacetime gas, electrino/positrino plasma, and reactions that consume or produce spacetime gas particles. Furthermore, the geometry of spacetime gas is expected to inform further research in quantum mechanics.

2.8. Galaxy Rotation Curves

Galaxy rotation curves are ascribed to dark matter in modern astrophysics. In the neoclassical physics model, there are a number of effects that influence galaxy dynamics and will require reconsidering galaxy physics.

First, mass energy is hidden when matter-energy becomes encapsulated in a Planck core. In an SMBH core ε- and ε+ particles are a phase of matter-energy where general relativity does not apply. Inside the Planck core, every particle is surrounded by particles with Planck energy. There is no possibility of transmission of energy below the

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surface of the Planck core. Hidden mass will directly influence the gravitational attraction of the SMBH on galactic matter.

Second, the emission and jetting of plasma and the subsequent decay and cooling produces new galaxy dynamics. One dynamic of note is outflowing spacetime gas. Even though we consider spacetime gas as a superfluid, it has drag at very small scales of action. This wind of spacetime gas may be an influence on galaxy rotation curves.

Third, new matter produced by Planck plasma decay will also influence the galaxy dynamics. Hydrogen and helium are the most abundant products. It is expected that this will contribute to new star formation. Furthermore, some of this newly formed matter may be destined to cycle through the SMBH repeatedly.

2.9. The Shape of the Cosmos

In one variant of the model, the extent of spacetime gas superfluid aether is infinite, or so large as to be considered infinite from the perspective of scientific observation.

In another variant, the spacetime gas superfluid aether is a bubble with a surface. It stands to reason that a steady state is reached at the surface with outflow of the gas balanced by spacetime particle decay into standard matter-energy. It is an open question if the surface decay process is conservative in the sense that no matter-energy escapes permanently beyond the surface of the cosmos gas bubble.

If the cosmos is permeated by a bubble of gas, determining what is beyond the surface will invite many new model ideas, including liquid and solid phases of spacetime gas, infinite voids, exotic bubble topologies, and many bubble universes.

2.10. Cosmic Recycling

There is a cycle of matter-energy being reduced to ε- and ε+ particle Planck cores in a galactic black holes, emission/jetting of ε- and ε+ plasma, spacetime gas formation and outflow, plasma and gas decay into standard matter-energy, and a journey back to a galactic black hole to be recycled as plasma. This cycle does not require a big bang nor an ever-expanding universe. As a result, science must, at least for the time being, view the age of the universe as unknown.

3. APPLYING THE MODEL

3.1. Low Temperature Matter

Aside from extreme energy conditions, in the low temperature zone outside of stars, black holes, jets, and colliders, there are five particles typically found in nature at the scales we can currently measure. These are the spacetime gas particle, proton, electron, neutron, and neutrino. Symbolically, we'll use g, p, e^-, n, and ν.

The spacetime gas particle, g, has the formula 6ε-/6ε+.

Two spacetime gas particles may react to form a proton and an electron.

$$g + g \Rightarrow p + e^-$$

$$6\varepsilon\text{-}/6\varepsilon\text{+} + 6\varepsilon\text{-}/6\varepsilon\text{+} \Rightarrow 6\varepsilon\text{-}/6\varepsilon\text{+} + /6\varepsilon\text{+} + 6\varepsilon\text{-}/$$

$$12\varepsilon\text{-}/12\varepsilon\text{+} \Rightarrow 6\varepsilon\text{-}/12\varepsilon\text{+} + 6\varepsilon\text{-}/$$

As we see, the equations conserve electrinos and positrinos. Furthermore, note that the anti-electron, aka positron, has a formula of /6ε+ and is mated with a spacetime gas particle to form a proton. Matter and anti-matter balance perfectly. It may be helpful to visualize a proton as a spacetime particle encapsulating a positron, although the specific geometry is unknown.

Two spacetime gas particles may react to form a neutron and a neutrino.

$$g + g \Rightarrow n + \nu$$

$$6\varepsilon\text{-}/6\varepsilon\text{+} + 6\varepsilon\text{-}/6\varepsilon\text{+} \Rightarrow 6\varepsilon\text{-}/6\varepsilon\text{+} + 3\varepsilon\text{-}/3\varepsilon\text{+} + 3\varepsilon\text{-}/3\varepsilon\text{+}$$

$$12\varepsilon\text{-}/12\varepsilon\text{+} \Rightarrow 9\varepsilon\text{-}/9\varepsilon\text{+} + 3\varepsilon\text{-}/3\varepsilon\text{+}$$

As we see, the equations conserve electrinos and positrinos. Furthermore, note that the anti-neutrino has a formula of 3ε-/3ε+ and is mated with a spacetime gas particle to form a neutron. The neutrino also has a formula of 3ε-/3ε+ since it is a Majorana particle. Matter and anti-matter balance perfectly. It may be helpful to visualize a neutron as a spacetime gas particle encapsulating an anti-neutrino, although the specific geometry is unknown.

3.2. Extreme Energy Particles

In stars, black holes, jets, colliders, and perhaps other reactions, high energy can lead to a number of exotic [n]ε-/[m]ε+ particles. Many of these are described by the standard model although the electrino/positrino formulation is missing from modern physics. Detailed data on many particles is found in the PDG listings (Tanabashi, 2018). Some decay modes are missing production or consumption of a spacetime gas particle.

3.3. Reactions that Consume or Produce Spacetime Gas Particles

The modern physics formula for beta$^-$ decay is:

$$n \Rightarrow p + e^- + \nu$$

However, that formula does not balance electrinos and positrinos. The model predicts the following correction:

$$n + g \Rightarrow p + e^- + \nu$$

We see that this decay reaction consumes a spacetime gas particle.

A number of other reactions have been found to be missing the expression of spacetime gas particles in the reaction formulas. A list of several found follows. The derivation is straightforward.

1. Hydrogen fusion into Deuterium in stage one of Hydrogen Helium fusion in stars up to ~1.3 $M_\odot$ consumes a spacetime gas particle.
2. CNO cycle in stars over ~1.3 $M_\odot$ requires a spacetime particle input to the ^{13}N to ^{13}C reaction, as well as to the ^{15}O to ^{15}N reaction.
3. In the bottle vs. beam experiment, there is a case where a neutron reacts with a spacetime gas particle to produce an anti-neutrino and return two spacetime gas particles to the aether. This decay mode would be counted in the bottle experiment but missed in the beam experiment. This may explain the discrepancy.
4. The LLNL and NIF are pursuing deuterium and tritium fusion which will produce helium, an anti-neutrino and a spacetime gas particle.
5. Of course, pair production from the quantum vacuum is consuming one or more spacetime gas particles.
6. Pi^0 decay modes 1 and 6 produce a spacetime gas particle, while decay mode 4 consumes a spacetime gas particle.

4. NEW INTERPRETATIONS OF NATURE

The neoclassical model thought experiment leads to many speculative, but seemingly logical, interpretations that may solve open problems and issues in physics and cosmology.

4.1. Origin and End of the Universe

The neoclassical model suggests that all AGN SMBH which jet electrino/positrino plasma accomplish what has previously been described as a single inflationary big bang. An examination of the inflationary big bang timeline appears to be roughly compatible with this jet process. For example, inflation would correspond to superluminal plasma jets. Since general relativity does not apply to the plasma, superluminality is possible. Furthermore, if the universe is a spacetime gas bubble, the gas may decay at the surface and lead to in-fall of standard matter-energy. Also, what has been interpreted as expansion may simply be the outflow of spacetime gas and/or a very small redshift causing drag on photons. This new interpretation of a recycling universe will obscure the true age of the universe. How long has the universe cycled? How much does the cycling ebb and flow causing fluctuating proportions of standard matter vs. spacetime gas over time?

4.2. Distances, Redshift, Curvature, Spacetime

The neoclassical model provides a physical medium of spacetime gas to implement Einstein's special and general relativity and the curvature of "spacetime". One cause of redshift around dense matter can now be seen to be related to the gravitational energy of the superfluid, and to be due to variable permittivity and permeability of the gas which changes the speed of light. Furthermore, on a universe scale, outflow of spacetime gas and/or lightweight drag on photons would also cause redshift. This may indicate that distances are different than what has been calculated by modern astrophysics.

4.3. Parity and Charge-Parity Symmetry

With the inclusion of the electrino and positrino particles and the composite spacetime particle, observed violations of symmetry will need to be re-examined. Perhaps symmetry may be preserved after all when all of the reactants are considered.

4.4. Reduction of Speculative Physics and Cosmology

The neoclassical model appears to lead to a reset to many hypotheses in physics and cosmology. No big bang. Singularity = phase change. No wormholes. No MWI. Complete re-evaluation of dark matter and dark energy models. No imbalance of matter and anti-matter. No supersymmetry. No holographic universe. No extra dimensions. Each of these areas was addressing a problem that has a more straightforward path to an answer with the neoclassical model.

5. RESEARCH DIRECTIONS

A tremendous amount of research is required to improve the model and its implications for the interpretation of nature. The nature of time and how it is influenced by the characteristics of spacetime gas is not yet understood. How do spacetime gas particles in reaction assume roles of W, Z, and H bosons? How do photons navigate the spacetime gas superfluid? How to improve general relativity around

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the extremes of energy where phase change and decay influence behavior. How do large gravitational waves propagate in the superfluid? These and many more questions are open.

6. SUMMARY

A parsimonious neoclassical model of nature is proposed where the electrino ε- and positrino ε+ are the basis of all matter, the carriers of all energy, and form a superfluid gas which permeates most of the universe. At high energies standard matter and spacetime gas superfluid change phase to electrino/positrino Planck cores wherein general relativity does not apply. Neither general relativity nor quantum mechanics include the electrino, positrino, nor spacetime particles. The neoclassical model informs solutions to many open problems in physics and cosmology. A new narrative emerges that requires recasting and reframing the narrative interpretations of experimental results and theory from physics, cosmology, and astronomy.

7. BIBLIOGRAPHY

Tanabashi, M. (2018). *Review of Particle Physics.* Phys. Rev. D 98, 030001.