Rethinking Supermassive Black Hole Dynamics

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1. INTRODUCTION

A set of hypotheses regarding supermassive black hole dynamics is offered as an alternative to the proposals of the Big Bang and cosmic inflation.

2. HYPOTHESES

2.1. A Volume of Planck Particles May Form in an SMBH

Planck particles are often considered to be an idealized model that falls out of dimensional analysis which yields the Planck scale. In this paper, we imagine that Planck particles are real, and that they have the ultimate Planck characteristics (e.g., temperature, energy, wavelength, etc.). Planck particles only form under the most extreme conditions of concentrated matter-energy, such as in a supermassive black hole of sufficient characteristics which are a subject for further research.

2.2. Planck Particles Do Not Participate in General Relativity

A volume of Planck particles corresponds to the singularity of general relativity. Planck particles carry the maximum energy possible, the Planck energy, and if surrounded by other Planck particles, they have no available mechanism to transmit energy quanta nor gravitational waves. Planck particles cannot signal their presence gravitationally, nor do they receive gravitational waves from any other matter-energy.

2.3. Planck Particles May Violently Emit from an SMBH

A volume of Planck particles is the densest matter-energy possible and is under the most extreme pressure possible. If a Planck volume forms in an SMBH and if subsequent conditions allow Planck particles to breach through the surface of the SMBH then there will be a violent emission of Planck plasma from the surface of the Planck volume. Some occurrences of SMBH jets may contain and be driven by Planck plasma. It may be possible that more violent ruptures of the interior Planck volume could occur in a merger event.

Understanding the conditions that enable Planck plasma emission is a subject for future research and should presumably be integrated with new understanding with regards to accretion disk flow. Likewise, there is new science needed for duration of Planck plasma flow, flow rate, and flow cessation.

2.4. Spacetime is Implemented with Standard Matter-Energy

Spacetime is implemented by a superfluid of standard matter-energy that is very lightly interacting. The superfluid structure overlays a 3D void of Euclidean space. The specific particles comprising the superfluid are to be determined by future research. For now, imagine the superfluid as a condensate of extremely low energy particles with the characteristics generally assigned to the quantum vacuum. The superfluid particles that implement spacetime can participate in reactions and are transmutable to other standard matter-energy particles (e.g., pair production).

3. BIG BANG-INFLATION VS. PLANCK EMISSION

Inflation proposes to explain several issues with the large-scale structure of the cosmos. Inflation is imagined as a serial, one-time process, subsequent to the Big Bang, where exponential expansion was driven by negative vacuum pressure.

Planck emission hypothesizes a parallel, galaxy-local, intermittent, and asynchronous process where the differential in pressure between Planck particle phase and a surface exposed to standard matter-energy at lower than Planck energy gives rise to event-local exponential expansion.

3.1. Horizon Problem

Big Bang theory interprets the cosmic microwave background (CMB) as leftover light from the early universe that has redshifted by a factor of z ~= 1090 on its way to our telescope sensors. How do we explain the isotropy to 1 part in 10000 for portions of the cosmos that are not in causal contact? Inflation explains the isotropy of the CMB by proposing a smaller homogenous initial universe that would have been in causal contact prior to inflation and therefore retains isotropy.

The galaxy-local Planck emission process from SMBH has no causal connection issue with the isotropy of the cosmic microwave background. With galaxy-local micro-bangs and galaxy-local inflation/expansion, we have a Planck process governed by identical physics throughout the universe. It is therefore natural to expect isotropy.

3.2. Flatness Problem

With Einstein's conception of spacetime as a curvable geometry, it opens the door to the question of the state of universe curvature throughout time. Why is curvature of the cosmos near zero now? If you work backwards, the cosmos would need to be extremely flat at the time of the Big Bang. Why was curvature near zero then?

Hypothesis 2.4 proposes that spacetime is implemented as standard matter-energy background superfluid filling a 3D

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Euclidean void space. There is no flatness issue to solve since space is given as geometrically flat by this hypothesis.

3.3. The Inflaton Field

Physicists have proposed a hypothetical inflaton field as a factor that enables inflation. With the Planckian emission process there is no inflaton field. Planck particles reacting and decaying into high energy photons, neutrinos, and other standard matter are expected to drive galaxy-local inflation and expansion.

3.4. Galaxy Seeding

Inflation theory predicts that quantum mechanical variation in the early stages of inflation gives rise to structure that seeds galaxies.

With a galaxy-local Planckian process galaxies are self-seeding in the sense that ingested matter-energy may emit given sufficient conditions and form freshly minted particles that seed new celestial objects, including structure that evolves into new galaxies. Therefore, galaxies are the dominant process at their scale and do not need an assist from a Big Bang nor one-time inflation.

3.5. Superluminality

Since general relativity does not apply to Planck particles in the plasma, superluminal jets may be possible. Prior interpretations of jets at narrow observing angles as explanations for observed superluminality may be revisited as some jets may be superluminal in reality.

4. NEW INTERPRETATIONS OF NATURE

New interpretations, insights, and predictions related to the Planck particle emission process may be testable by examining the model fit with observations, combined with parsimony and resolution of tensions in modern physics.

4.1. Cosmic Recycling vs. Origin and End of the Universe

The set of all AGN SMBH which jet Planck plasma intermittently throughout time accomplishes what has previously been described as a one-time Big Bang and inflation era. The science of the Big Bang-inflation, particularly the sequence within the timeline, may be roughly compatible with the Planckian emission process reframed for galaxy-local scale. This new interpretation of a recycling universe will obscure the true age of the universe. How long has the universe cycled?

4.2. Galaxy Rotation Curves

Galaxy rotation curve anomalies are ascribed to dark matter in modern astrophysics. However, the galaxy-local Planck emission process provides new mechanisms that may influence galaxy dynamics and will require reconsidering galaxy physics including rotation curves.

Matter-energy is gravitationally non-interacting when it is in Planck particle form interior to a Planck volume. This suggests that under sufficient conditions, some matter-energy ingested by an SMBH may subsequently cease to contribute to the mass of the SMBH if that matter-energy reaches the Planck phase. The apparent vanishing of this mass will directly influence the gravitational attraction of the SMBH upon galactic matter.

Emitted Planck plasma will also be gravitationally non-interacting until which point all Planck particles have decayed to lower energy matter. The emission and jetting of Planck plasma and the subsequent decay and cooling may produce new galaxy dynamics.

Furthermore, recycled matter-energy produced by Planck plasma decay may also influence galaxy dynamics. It is expected that the ejecta will contribute to new star formation and possibly new child galaxy formation. Furthermore, some of this newly formed matter may be destined to cycle through an emitting SMBH repeatedly.

4.3. A New Redshift Mechanism

When Planck particles emit, a period of inflation and rapid expansion occurs locally to the surface of the Planck plasma. High energy photons are one reaction product to expect, and they would experience a form of redshift while transiting the inflation/expansion region. This form of redshift is not yet accounted for in modern science.

5. SUMMARY

A hypothesized galaxy-local process of Planck particle emission from supermassive black holes appears to lead to new insights about nature. This process is roughly compatible with existing observations but requires new interpretations with regards to the Big Bang, cosmic inflation, galaxy rotation curves, and redshift.