Exotic Matter Formation as the Trigger of the Cosmological Bounce

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Article

Exotic Matter Formation as the Trigger of the Cosmological Bounce

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Abstract

In this note we restrict attention to the final stage of a cosmological contraction, immediately before the bounce. We propose that the formation of exotic matter is a prerequisite for the rebound. Drawing inspiration from Lockyer's layered proton model, which envisions the proton as a system of nested energy shells, we hypothesize that under extreme pressure and gravitational confinement, nucleons may evolve into more complex particles containing additional layers of energy. The collapse of such particles would liberate immense energy, thereby initiating expansion. Unlike many speculative cosmological scenarios, this work does not address the earlier mechanism of expansion and contraction, but focuses solely on the necessary conditions for the bounce itself.

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1. Introduction

The origin of the Universe has traditionally been discussed within two competing frameworks: the eternal static Universe [1–3] and the Big Bang [4]. A third approach, the Big Bounce, has been developed in various forms [5,6], where contraction is followed by expansion without invoking a singularity.

Lockyer's non-conventional proton model [7] is of particular interest in this context. Although it does not describe quarks explicitly, but rather conceives nucleons as composed of concentric layers of energy, it succeeds in calculating the proton-to-electron mass ratio with seven significant digits of accuracy, and the neutron-to-electron mass ratio with six digits of accuracy. This remarkable predictive power suggests that the model captures essential structural features of nucleons in terms of layered energy shells. In this short article we propose that the essential ingredient for the cosmological rebound is the creation of exotic matter under conditions of extreme gravitational compression, extrapolating from this layered structure.

2. Lockyer's Proton Model and Exotic Extensions

Lockyer's proton model envisions the proton as a positron containing 18 nested layers of energy. We extend this idea by postulating the possibility of even more complex particles—"exoprotons" or "exoneutrons"—which could form when gravitational and pressure conditions exceed those attainable in ordinary stellar environments.

These exotic particles could be viewed as protons or neutrons 'augmented' in energy, that is, endowed with a greater number of indented energy levels. The number of such nested levels would increase as the conditions of pressure and energy density become more extreme.

3. Collapse and Energy Release

At a critical threshold, the confining structure of these exotic nucleons becomes unstable. The trapped radiation is abruptly released, leading to a violent liberation of energy. This process reduces local density and reverses the contraction, driving the Universe into a new phase of expansion.

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In this framework, singularities never occur: neither at the center of black holes nor at the cosmological bounce. Instead, the breakdown of confinement provides a physical mechanism to avoid mathematical infinities.

4. Black Holes as Reservoirs

Black holes, in this view, may already contain exotic matter stabilized by internal pressure, though generally with fewer layers than those formed in the final contraction of the Universe. They act as natural laboratories where partial forms of this exotic matter may exist, but only the global contraction of the cosmos can generate the critical conditions required for the full rebound.

5. Conclusion

We have suggested that the formation and collapse of exotic matter, inspired by Lockyer's proton model, provides the necessary trigger for the cosmological bounce. This approach avoids singularities and offers a concrete physical mechanism to connect contraction and expansion, while remaining agnostic about the broader cosmological dynamics.

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