

## A Conceptual Study for Investigating the Creation of Energy and Understanding the Properties of Nothing

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**Abstract :** The universe is in a continuous expansion process, resulting in the reduction of its density and temperature. Also, by extrapolating back from its current state, the universe at its early times is studied, known as the big bang theory. According to this theory, moments after creation, the universe was an extremely hot and dense environment. However, its rapid expansion due to nuclear fusion led to a reduction in its temperature and density. This is evidenced through the cosmic microwave background and the universe structure at a large scale. However, extrapolating back further from this early state reaches singularity, which cannot be explained by modern physics, and the big bang theory is no longer valid. In addition, one can expect a nonuniform energy distribution across the universe from a sudden expansion. However, highly accurate measurements reveal an equal temperature mapping across the universe, which is contradictory to the big bang principles. To resolve this issue, it is believed that cosmic inflation occurred at the very early stages of the birth of the universe. According to the cosmic inflation theory, the elements which formed the universe underwent a phase of exponential growth due to the existence of a large cosmological constant. The inflation phase allows the uniform distribution of energy so that an equal maximum temperature can be achieved across the early universe. Also, the evidence of quantum fluctuations of this stage provides a means for studying the types of imperfections the universe would begin with. Although well-established theories such as cosmic inflation and the big bang together provide a comprehensive picture of the early universe and how it evolved into its current state, they are unable to address the singularity paradox at the time of universe creation. Therefore, a practical model capable of describing how the universe was initiated is needed. This research series aims at addressing the singularity issue by introducing a state of energy called a "neutral state," possessing an energy level that is referred to as the "base energy." The governing principles of base energy are discussed in detail in our second paper in the series "A Conceptual Study for Addressing the Singularity of the Emerging Universe," which is discussed in detail. To establish a complete picture, the origin of the base energy should be identified and studied. In this research paper, the mechanism which led to the emergence of this natural state and its corresponding base energy is proposed. In addition, the effect of the base energy in the space-time fabric is discussed. Finally, the possible role of the base energy in quantization and energy exchange is investigated. Therefore, the proposed concept in this research series provides a road map for enhancing our understating of the universe's creation from nothing and its evolution and discusses the possibility of base energy as one of the main building blocks of this universe.

**Keywords :** big bang, cosmic inflation, birth of universe, energy creation, universe evolution

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