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A semi-analytical approach to the abundance of light elements in Big Bang nucleosynthesis

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Abstract
This paper presents a comprehensive semi-analytical approach to the temporal evolution and final abundance of light elements ^{7}Be formed during Big Bang nucleosynthesis. By systematically examining the fundamental processes, we reveal the complex physics involved in the formation of these primordial elements. Our findings not only enhance the understanding of nucleosynthesis dynamics but also provide valuable insights into the conditions of the early universe and emphasize the importance of light elements in cosmic evolution. One of the most significant results of this paper is the derivation of semi-analytical relations for the final abundance of light elements as a function of the normalized baryon-to-photon ratio (η_{10}). In the end, the acceptable range of the parameter η_{10} is discussed through a comparison of observational results.

Keywords: Big Bang nucleosynthesis, Light elements, Early universe

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