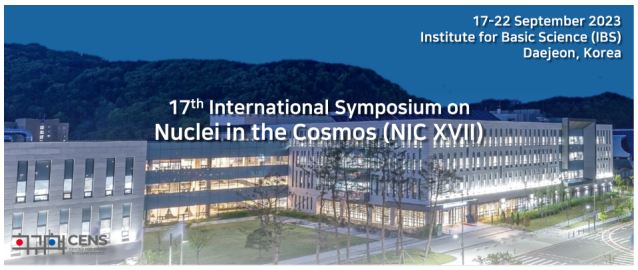

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Revisiting the Gamow Factor of Reactions on Light Nuclei

Tuesday, 19 September 2023 17:10 (5 minutes)

In this presentation, we provides an improved understanding of the penetration probabilities(PPs) in nuclear reactions for light nuclei by rectifying the assumptions utilized in the conventional Gamow factor. The Gamow factor effectively represents PP in nuclear reactions based on two assumptions: particle energy lower than the Coulomb barrier, and the disregard of nuclear interaction potential dependence. However, our findings reveal that these assumptions are invalid for light nuclei. Through calculations that exclude the aforementioned assumptions, we derived a PP that is dependent on the depth of nuclear interaction potential for light nuclei. With the potential depth fitted by experimental fusion cross-sections, we demonstrate that the PPs of light nuclei (D+D, D+T, D+3He, p+D, p+6Li, and p+7Li) exceed the conventional values near the Coulomb barrier. Additionally, we discuss the implications of this modified PP, such as alterations in the Gamow peak energy, which governs the measurement of the energy range of nuclear cross-sections in experiments, and the electron screening effect.

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