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Impact of cluster resonances on low-energy nuclear fusion reactions

Tuesday, January 28, 2025 9:30 AM (40 minutes)

Theoretical evaluation of fusion reaction rates, critical in astrophysical phenomena, is essential because low-energy data, which are often difficult to measure directly, are required. This talk will discuss the effects of cluster resonances on $^{12}\text{C}+^{12}\text{C}$ and $^{12}\text{C}+^{16}\text{O}$ fusion reactions. Resonances drastically increase the cross section and thus can significantly impact the reaction rate. Theoretical evaluation of the properties of resonances, such as partial decay width, is also challenging because we must deal with the channel coupling of the entrance and exit channels. The general coupling potential is unknown, and we cannot treat it phenomenologically. In this talk, we treat various channel couplings employing a microscopic model to obtain resonance states and estimate their contribution to the fusion reaction.

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