

Determination of strengths of cluster states near reaction threshold

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$^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$, $^{13}\text{C}(\alpha,n)^{16}\text{O}$ and $^{12}\text{C}+^{12}\text{C}$ are the crucial reactions in the evolution of stars. These reactions create carbon and oxygen in our universe, provide neutrons to synthesize the elements heavier than iron, and define the explosive conditions of superburst. Due to the nuclear clustering effect, resonances form near the thresholds of these reactions and dominate the contribution of the reaction cross sections at stellar energies. In the past seven decades, direct and indirect measurements, together with a number of theoretical approaches, have been endeavored to achieve the precision required by astrophysical models. In this talk, the recent progress in the studies of these reactions will be reviewed and my perspectives on future experiments will also be provided.

Experimental study on nuclear physics

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