

CARBON FUSION REACTION IN THE UNIVERSE AND LABORATORIES

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Carbon fusion reaction is a crucial reaction in stellar evolution. Due to its complicated reaction mechanism, there is a large uncertainty in the reaction rate which limits our understanding to various stellar objects, such as massive stars, type Ia supernovae, and superbursts. In this talk, I will review the challenges in the study of carbon burning. I will also report recent results from our studies: 1) an upper limit for the $^{12}\text{C} + ^{12}\text{C}$ fusion cross sections, 2) a new measurement of the $^{12}\text{C}(^{12}\text{C}, n)^{23}\text{Mg}$ reaction, 3) examination of the predictive power of extrapolating models for heavy ion fusion reaction at stellar energies. An outlook for the future studies of the astrophysical heavy ion fusion reactions will also be presented.