

Nuclear Astrophysics at JUNA

Friday, 23 February 2024 10:00 (30 minutes)

The $^{13}\text{C}(\alpha, n)^{16}\text{O}$ reaction is the main neutron source for the s-process in AGB stars. Meanwhile, this reaction is also believed to be the neutron source for the i-process although its astrophysical site is still unclear. Direct measurement of its cross section at astrophysical energies is challenging in above-ground laboratories due to the vast cosmic-ray induced background. Underground laboratories have orders-of-magnitude lower background and open new opportunities for such measurements. We performed consistent measurements of the cross section covering a wide energy range of $E_{\text{c.m.}} = 0.24 - 1.9$ MeV at JUNA and Sichuan University. Our measurement covers almost the entire i-process Gamow window in which the large uncertainty of the previous experiments has been reduced from 60% down to 15%, eliminates the large systematic uncertainty in the extrapolation arising from the inconsistency of existing data sets, and provides a more reliable reaction rate for the studies of the s- and i-processes. Detailed description of our measurement, including experimental setups and data analysis, will be presented in this talk. A short outlook and future plans on the new measurements of this reaction at JUNA will be shown.

Presenter: Dr GOA, Bingshui

Session Classification: Perspectives