



LNGS SEMINARS

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Measurements of (α, n) Cross Sections for Nuclear Astro- and Applied Physics

Abstract

In nuclear astrophysics (α, n) reactions act as neutron sources for the s-process. Key reactions such as $^{13}\text{C}(\alpha, n)^{16}\text{O}$ and $^{22}\text{Ne}(\alpha, n)^{25}\text{Mg}$ are amongst the first reactions to be studied in the new deep underground accelerator laboratories that will start to operate in the near future (LUNA MV, CASPAR and JUNA). To fully benefit from the underground location and achieve the required sensitivity it is crucial to understand and mitigate beam-induced backgrounds, i.e. the detection of neutrons from spurious reactions. Furthermore, the knowledge of (α, n) reaction cross sections is relevant in the research for applications of nuclear fusion and fission reactions.

A series of cross section measurements for (α, n) reactions is ongoing at the at the Nuclear Science Lab at the University of Notre Dame. In this talk I will present the experiments to measure $^{10}\text{B}(\alpha, n)^{13}\text{N}$ and $^{17}\text{O}(\alpha, n)^{20}\text{Ne}$, with a focus on the employed techniques such as fast neutron detection with deuterated liquid scintillators and gamma ray detection with an array of $\text{LaBr}_3\text{:Ce}$ scintillation detectors.

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