Contribution ID: **282** Type: **Poster**

Measurement of $^{26}\mathrm{Al}(n,p)$ and $^{26}\mathrm{Al}(n,\alpha)$ Cross Sections in Supernova Temperatures

Monday 16 September 2024 18:16 (1 minute)

The radioisotope $^{26}\mathrm{Al}$ plays a crucial role in understanding the origins of cosmic elements, particularly at active nucleosynthesis sites such as supernovae and massive star-forming regions. Its characteristic 1809 keV γ-ray emission, observed by gamma telescopes, serves as direct evidence of ongoing nucleosynthesis processes. Neutron-induced reactions, specifically the $^{26}\mathrm{Al}(n,p)$ and $^{26}\mathrm{Al}(n,\alpha)$ reactions, have been identified as key contributors to the $^{26}\mathrm{Al}$ abundance in core-collapse supernova ejecta.

Despite recent progress in measuring these reaction rates up to temperatures of ~ 1 GK, which are relevant to some $^{26}\mathrm{Al}$ creation sites, it remains insufficient for explosive scenarios occurring at temperatures between 1.5 and 3.5 GK. Experimental data for these temperatures are currently lacking due to several challenges. These include the necessity for a powerful neutron source at the relevant energies, constraints on radioactive sample size, and difficulty measuring outgoing charged particles in high radiation environments.

In this study, we propose a novel experimental approach using the $^{7}\mathrm{Li}(p,n)$ reaction to generate broad-energy neutron beams. Coupled with a gaseous Micromegas detector, this setup will enable comprehensive measurement of $^{26}\mathrm{Al}(n,p)$ and $^{26}\mathrm{Al}(n,\alpha)$ reaction rates across the relevant energy range. Our study aims to advance cosmic nucleosynthesis understanding and enhance astrophysical modeling by bridging this knowledge gap.

Primary authors: Mr GREEN, Akiva (Hebrew University of Jerusalem); Dr YADAV, Chandrabhan (Hebrew University of Jerusalem); Dr FRIEDMAN, Moshe (Hebrew University of Jerusalem)

Presenter: Mr GREEN, Akiva (Hebrew University of Jerusalem)

Session Classification: Poster Flashes