## The role of gamma-induced experiments in the p-process

Thursday 17 October 2024 10:50 (20 minutes)

Photonuclear reactions are critical in p-process nucleosynthesis, which produces rare proton-rich isotopes (p-nuclei) through  $\gamma$ -induced reactions like ( $\gamma$ , n), ( $\gamma$ , p), and ( $\gamma$ ,  $\alpha$ ). These reactions occur at temperatures from 1.5 to 3.5 GK, typically in explosive environments such as ty-pe II or type Ia supernovae. Theoretical estimates of p-nuclei nucleosynthesis are uncertain, requiring accurate photodisintegration reaction rates for about 3000 stable proton-rich nuclei. Our experimental campaign at the High Intensity Gamma-Ray Source (HI $\gamma$ S) focused on measuring the ( $\gamma$ , p) and ( $\gamma$ ,  $\alpha$ ) reactions of <sup>112</sup>Sn and <sup>102</sup>Pd, whose cross-sections were previously only theoretically calculated, usually using a Hauser-Feshbach approach. Understanding the alpha optical model potential ( $\alpha$ -OMP) is crucial for these calculations, especially at astrophysical energies, as it is one of the main sources of uncertainties.

Utilizing the SIDAR array of highly-segmented, high-resolution silicon detectors coupled with the ORRUBA/GODDESS data acquisition system, the P-Process HI<sub>Y</sub>S Collaboration measured the charged particle spectra of the fusion products. Through dedicated and accurate beam dia-gnostics, the total and partial cross sections can be efficiently derived with small uncertainties and compared to predictions.

In this presentation, the experimental setup, preliminary analysis, and future plans will be discussed.

## Length of presentation requested

Oral presentation: 17 min + 3 min questions

## Please select a keyword related to your abstract

Nuclear Theory and Experiments

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