# Experimental studies of gamma-induced reactions for the p-process*

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The production of a series of rare, proton-rich stable isotopes, known as the p-nuclei, remains an open question in nuclear astrophysics. The p-nuclei cannot be produced through the known neutron capture processes such as the s- and r-process, but instead are thought to be created in specific astrophysical environments where a series of photodisintegration reactions on s-nuclei seeds takes place. Various sites have been proposed for the production of p-process nuclei, such as Type Ia supernovae or neutrino-driven winds from core collapse supernovae. However, a major source of uncertainty in understanding the production of p-nuclei is the necessity to use cross sections and reaction rates derived from theoretical models; the statistical Hauser-Feshbach approach is often adopted, but with very little experimental constraint. These cross section predictions can vary by orders of magnitude, preventing a careful assessment of the conditions needed to produce p-nuclei in the abundances observed today.

To address the need for experimental constraints of the predicted cross sections, the HIgS P-Process Collaboration has undertaken several measurements of gamma-induced charged-particle emission of p-process nuclei across the range of energies relevant to explosive supernova environments. By utilizing an array of highly-segmented, high resolution silicon detectors, measurements of the energy and angle of the outgoing protons and alphas produced in the photodisintegration reactions are made from monoenergetic beams of gamma rays at HIgS. Both the total and partial cross sections can hence be derived and compared to predictions. In this talk, the experimental setup, preliminary analysis, and future plans will be discussed.

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