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Proton-Induced Reactions at the ESR Storage Ring

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To understand and model element synthesis and energy budget in stars a large number of nuclear reaction cross sections must be known. For explosive stellar scenarios, like supernovae or x-ray bursts, this heavily involves nuclei beyond stability. However, due to the challenges inherent to related experiments, the lack of available experimental data in this domain is severe.

A new method for measuring cross sections of proton-induced reactions has been developed using cooled and decelerated beams at the ESR heavy ion storage ring at GSI. It enables studies of (p,γ) and (p,n) reactions on radioactive ions inside or close to the astrophysical Gamow window, which can deliver the necessary constraints for nuclear theory and astrophysics.

Most recently, the technique was upgraded, enabling the first successful application to a radioactive beam. This talk will give an overview of past and recent developments and results, as well as an outlook to future experiments and physics cases.

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