

Status on the proton-capture campaign at GSI

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Highly-charged stable or radioactive ions can be stored and cooled in a heavy-ion storage ring offering unrivaled capabilities for precision studies for the atomic, nuclear structure, and astrophysics [1]. We have employed the unique feature of the Experimental Storage Ring (ESR) facility at GSI to address astrophysically relevant reactions. In 2009, as a proof-of-concept experiment, the cross section of $^{96}\text{Ru}(p,\gamma)$ has been successfully investigated [2]. Later, in 2016 the study of the $^{124}\text{Xe}(p,\gamma)$ reaction has been performed with decelerated fully-ionized $^{124}\text{Xe}^{54+}$ ions [3]. Using a Double Sided Silicon Strip Detector (DSSSD), introduced directly into the Ultra High Vacuum environment of the storage ring, the ^{125}Cs proton-capture reaction products have been successfully detected on the high energy tail of the Gamow-window for hot, explosive scenarios. Early this year, in March 2020, as the next step in our experiment campaign the first attempt was carried out to measure the proton-capture using a radioactive ion beam.

In this contribution, our precision (p,γ) reaction studies will be introduced highlighting the developments on the used measurement techniques. In addition, a novel approach will be expounded to increase the sensitivity of the identification for (p,γ) products by combining active ion scraping with offline energy selection on the detected ions.

References

- [1] Bosch F et al 2013 Prog. Part. Nucl. Phys. 73 84
- [2] Mei B et al 2015 Phys. Rev. C92 035803
- [3] Glorius J et al 2019 Phys. Rev. Lett. 122 092701

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