

## Breakup of proton-rich nuclei at SAMURAI for investigation of astrophysical reaction rates in explosive hydrogen burning.

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Availability of energetic secondary beams of proton-rich nuclei at RI Beam Factory in RIKEN opens an access to experimental studies of specific proton-capture reactions occurring during explosive hydrogen burning at extreme temperature and density conditions in stellar environment. The newly developed experimental setup utilizing SAMURAI spectrometer [1] is most suitable for such studies due to a possibility of performing large-acceptance and full-kinematics measurements of the reaction products stemming from breakup in Coulomb and nuclear fields. One of the primary focuses of the experimental program at SAMURAI is investigation of proton-capture rates in the vicinity of waiting-point nuclei of rp-process and their implications for the type I X-ray bursts. Due to the usage of high-precision silicon trackers coupled with wide-dynamic-range preamplifiers, heavy fragments up to  $Z=50$  and protons can be identified and tracked simultaneously event-by-event. The obtained experimental information will allow us to characterize the corresponding time-reversal proton-capture reactions as well as to pin down the reactions with the most significant impact on the rp-process and XRB observables. Details of the experimental method, instruments and preliminary results of the benchmark experiments will be discussed in this presentation.

[1] <http://www.nishina.riken.jp/RIBF/>

[2] T. Kobayashi et al. Nucl. Inst. Meth. **B 317**, 294 (2013).