Contribution ID: **160** Type: **Oral Contribution**

Proton capture on stored radioactive ions

Tuesday 25 October 2022 09:05 (35 minutes)

By combining two unique facilities at GSI (Helmholtz Centre for Heavy Ion Research),
the fragment separator (FRS) and the experimental storage ring (ESR), the first direct measurement of a proton capture reaction of a stored radioactive isotope has been accomplished. The combination of sharp ion energy, ultra-thin internal gas target, and the ability to adjust energy of the beam in the ring enables precise, energy-differentiated measurements of the (p,X)-cross-sections. Our new results provide a sensitive method for measuring (p,X) and (p,n) reactions relevant for nucleosynthesis processes in supernovae, which are among the most violent explosions in the universe and are not yet well understood.

The cross section of the 118Te(p,X) reaction was measured at energies of astrophysical interest. The heavy ions were stored with energies of 6 MeV/nucleon and 7 MeV/nucleon and interacted with a hydrogen jet target. The produced 119I ions were detected with double-sided silicon strip detectors. The radiative recombination process of the fully stripped 118Te ions and electrons from the hydrogen target was used as a luminosity monitor.

These measurements follow a proof-of-principle experiment which was performed in 2016 to validate the method on the stable isotope 124Xe [1].
An overview of the experimental method and preliminary results from the ongoing analysis will be presented.

[1] J. Glorius et al., Phys. Rev. Lett. 122, 092701 (2019)

Primary author: DELLMANN, Sophia Florence (Goethe University Frankfurt)

Co-authors: GUMBERIDZE, Alexandre; SURZHYKOV, Andrey; LÖHER, Bastian (GSI); JURADO APRUZZESE, Beatriz (CENBG); BRUECKNER, Benjamin; LORENZ, Bernd Alfred (GSI); BRUNO, Carlo (The University of Edinburgh); LANGER, Christoph (FH Aachen, GSI); SCHEIDENBERGER, Christoph (GSI); GRIFFIN, Christopher; KOZHUHAROV, Christophor (GSI); LEDERER-WOODS, Claudia (The University of Edinburgh (GB)); Dr VESCOVI, Diego (Goethe University Frankfurt); DMYTRIEV, Dmytro (GSI); HAETTNER, Emma (GSI Helmholtzzentrum für Schwerionenforschung GmbH); LORENZ, Enis (Technische Universität Darmstadt); MENZ, Esther (GSI); Mr LECKENBY, Guy (TRIUMF); GEISSEL, Hans (GSI); TORNQVIST, Hans Toshihide (Chalmers University of Technology (SE)); WEICK, Helmut (GSI Helmholtzzentrum für Schwerionenforschung); DILLMANN, Iris; KULIKOV, Ivan (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); SWARTZ, Jacobus Andreas (CENBG); GLORIUS, Jan; PIBERNAT, Jerome; Mr MARSH, Jordan (University of Edinburgh); Dr AL-KHASAWNEH, Kafa (Goethe University Frankfurt); GOBEL, Kathrin (Goethe University Frankfurt (DE)); VARGA, L (GSI Helmholtzzentrum für Schwerionenforschung GmbH); BOTT, Lukas (Goethe University Frankfurt); ALIOTTA, Marialuisa (University of Edinburgh); WEIGAND, Mario (Goethe University Frankfurt); STECK, Markus; HEIL, Michael (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); LESTINSKY, Michael (GSI Darmstadt); SGUAZZIN, Michele (CENBG); PETRIDIS, Nikolaos (GSI Helmholtzzentrum); FORSTNER, Oliver (Friedrich-Schiller-Universitaet Jena (DE)); WOODS, P J (University of Edinburgh); ERBACHER, Philipp (Goethe University Frankfurt); HILLENBRAND, Pierre-Michel (GSI); SIDHU, Ragandeep Singh; HESS, Regina (GSI); REIFARTH, Rene (Goethe University Frankfurt (DE)); GRISENTI, Robert (GSI); JOSEPH, Ronald (GSI); CHEN, Rui-Jiu (Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, D-69117 Heidelberg, Germany); LITVINOV, Sergey (GSI); SANJARI, Shahab (GSI Darmstadt); HAGMANN, Siegbert (GSI); YAMAGUCHI, Takayuki (Saitama University (JP)); PSALTIS, Thanassis; DAVINSON, Thomas (The University of Edinburgh (GB)); STOEHLKER, Thomas (GSI); DICKEL, Timo; MOR-

GENROTH, Tino (GSI); POPP, Ulrich (GSI); SPILLMANN, Uwe (GSI); XING, Yuanming (GSI); LITVINOV, Yuri (GSI, Darmstadt)

Presenter: DELLMANN, Sophia Florence (Goethe University Frankfurt)

Session Classification: Plenary Talks

Track Classification: Plenary Talks