HK 59: Nuclear Astrophysics IV

Zeit: Freitag 14:00–15:30 Raum: HZO 100

HK 59.1 Fr 14:00 HZO 100

Bound-state beta-decay of bare 205Tl ions at the ESR — •Ragandeep S. Sidhu for the Bare 205Tl experiment at GSI-Collaboration — GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany

In the present study we aim to determine the bound-state beta-decay rate of fully-ionized 205Tl, which is needed to determine the matrix element for the electron capture decay of the 2.3 keV excited state in 205Pb to the ground state of 205Tl. This matrix element is important for the determination of neutrino capture probability into the 2.3 keV state of 205Pb. In this talk, the production of bare 205Tl81+ from 206Pb beam, it's separation from contaminants, transmission, storage and beam preparation in the ESR, as well as detection of decay events and auxiliary calibration measurements will be discussed. [1]M.K. Pevicevic et al., Nucl. Instr. and Meth. A 621, 282 (2010). [2]J.B. Blake and D.N. Schramm, Astroph. J. 197, 615-629 (1975).

HK 59.2 Fr 14:15 HZO 100

Direct measurement of the ^{96}Ru(p,γ)^{97}Rh capture cross section — •Meiko Volknandt[1], Markus Reich[1], René Reifarth[1], Jan Glorius[2], Yuri Litvinov[2], Michael Wiescher[3], Joachim Goerres[3], and Edward Stech[3] — [1]Goethe Universität, Frankfurt, Germany — [2]GSI, Darmstadt, Germany — [3]University of Notre Dame, Notre Dame, USA

Comparing the solar abundances of ^{96}Ru to theoretical p-process calculations shows a large underproduction of the nucleus in the models. Therefore the nuclear data input needs to be constrained by experiments.

In 2015, a proof-of-principle experiment was performed at the experimental storage ring ESR at GSI, Darmstadt, where the reaction cross section of the reaction ^{96}Ru(p,γ)^{97}Rh has been measured in inverse kinematics at energies between 9 and 11 MeV.

To verify this method, an activation experiment was performed at the Instutute for Structure and Nuclear Astrophysics at Notre Dame, USA.

The ^{96}Ru(p,γ)^{97}Rh cross section has been directly measured at 3 MeV to compare with a previous activation experiment as well as between 9 and 11 MeV. An overview of the experiment as well as the preliminary results is presented.

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HK 59.3 Fr 14:30 HZO 100

Neutroneneinfangquerschnitte von ^{85,87}Rb — •Franz Pfeifer[1], Bayarbadrakh Baramsai[2], Aaron Couture[2], Stefan Fiebiger[1], Charles Kelsey[2], Deniz Kurtulgil[1], Shea Mosby[2], René Reifarth[1], Gencho Rusev[2], John Ullmann[2], Mario Weigand[1] und Clemens Wolf[1] — [1]Goethe-Universität Frankfurt am Main, Deutschland — [2]Los Alamos National Laboratory, USA

Neutroneneinfänge und β-Zerfälle konkurieren während der Entstehung von Elementen schwerer als Eisen im langsamen Neutroneneinfangprozess (s-Prozess). Nahe des Verzweigungspunktes von ^{85}Kr werden die Neutroneneinfangquerschnitte von ^{85,87}Rb untersucht. Diese können wichtige Informationen zum ^{87}Rb/^{87}Sr-Cosmochronometer und somit zum Alter des Universums liefern.

Flugzeitmessungen an ^{nat}Rb in Form von RbCl und PVC für den ^{35,37}Cl-Untergrundabzug sind am Los Alamos National Laboratory (USA) durchgeführt worden. Ein 1/v-Neutronenenergiespektrum traf nach 20m auf das Target. Der das Target in 4π umgebende BaF_2-Detektor ist in der Lage mit hoher Effizienz Gammasstrahlung aus Zerfallskaskaden zu detektieren. Messdaten und erste Ergebnisse der Auswertung werden präsentiert.

Dieses Projekt wird durch EU-Projektmittel der Nummer 615126 gefördert.

HK 59.4 Fr 14:45 HZO 100

FLUKA simulations of the neutron flux in the Dresden Felsenkeller — •Marcel Grieger[1,2], Daniel Bemmerer[1], Thomas Hensel[1,2], Stefan E. Müller[1], and Kai Zuber[2] — [1]Helmholtz-Zentrum Dresden-Rossendorf — [2]Technische Universität Dresden

The Dresden Felsenkeller is a shallow-underground site featuring a rock overburden of 47 m which hosts a 5 MV Pelletron accelerator in tunnels VIII and IX. Using previous measurements in the low-background γ-counting facility in tunnel IV as a benchmark, a FLUKA simulation has been developed to predict the neutron flux in tunnels VIII and IX. The simulation results provide insight into local neutron field inhomogeneities caused by the measurement environment itself.

HK 59.5 Fr 15:00 HZO 100

Spectral neutron flux from 10 meV up to 100 MeV in the Dresden Felsenkeller — •Thomas Hensel[1,2], Daniel Bemmerer[1], Marcel Grieger[1,2], Stefan E. Müller[1], Tamás Szücs[1], and Kai Zuber[2] — [1]Helmholtz-Zentrum Dresden-Rossendorf — [2]Technische Universität Dresden

Neutron flux measurements with moderated ^{3}He proportional counters have been performed in three distinct laboratories of the underground site Felsenkeller. The six polyethylene moderators of a previous measurement have been complemented by a new moderator with a lead liner to provide information about the neutron flux above 10 MeV. The results quantify the shielding's influence on the neutron flux and inform the planning of future underground laboratories.

HK 59.6 Fr 15:15 HZO 100

Performance and testing of Ultra High Vacuum compatible silicon strip detectors at Gsi storage rings — •Laszlo Varga for the Uhv Si strip detectors-Collaboration — Gsi, Germany

In the nucleosynthesis of the so-called p nuclei radiative capture reactions like (p,γ) or (α,γ) play an important role to model the reaction network and to explain the stellar production yields in different explosive scenarios [1]. The storage rings at Gsi, the Experimental Storage Ring (Esr) and the Cryring, provide unrivaled opportunity to allow the corresponding reaction studies. Both grant the storage of sufficient amount of ions in a nearly background-free environment for reaction studies in inverse kinematics.

After the successful investigation of the cross section of 96Ru(p,γ) in 2009 [2] and the cross sections of 124Xe(p,γ) in 2016, the performance and commissioning of improved Esr and Cryring detection system designs are carried out for the first experiments in 2018. The particle detection with a nearly 100% efficiency is realized by ultra high vacuum (Uhv) compatible double-sided silicon strip detectors (Dsssd), which are excellent candidate to measure first time the proton-capture inside the Gamow-window using stored, radioactive ions.

References: [1] - M. Pignatari et al. 2016 Int. J. Mod. Phys. E 25 1630003 [2] - B. Mei et al., Phys. Rev. C92 (2015) 035803