HK 68: Instrumentation XVIII

Time: Thursday 16:00–17:15 Location: HK-H4

Group Report HK 68.1 Thu 16:00 HK-H4

Status of R3B setup for as part of the FAIR Phase-0 program — •Andrea Jedele for the R3B-Collaboration — Technische Universität Darmstadt, Fachbereich Physik, D-64289 Darmstadt — GSI Helmholtzzentrum für Schwerionenforschung, D-64291 Darmstadt — Helmholtz Forschungsakademie Hessen für FAIR, D-64289 Darmstadt

The R3B experimental setup located at GSI will be used for upcoming experiments as part of the FAIR Phase-0 program. The versatile setup with large geometric coverage and particle resolution allows for the study of nuclear reaction and structure at relativistic energies.

The experimental setup will be presented followed by an overview of the various detector subsystems. Preliminary results for each detector will be presented to highlight the performance capabilities of the complete setup for upcoming experiments.

This work is supported by the German Federal Ministry for Education and Research (BMBF) under contract number 05P21RDFN2 and by the GSI-TU Darmstadt cooperation agreement.

HK 68.2 Thu 16:30 HK-H4

The new MINIBALL triple cluster detector — •Jasper Wehlitz, Rainer Abels, Timon Büsken, Jürgen Eberth, Kai Henseler, Herbert Hess, Rouven Hirsch, Darius Luyken, and Peter Reiter — IKP Universität zu Köln, Cologne, Germany

The Miniball MB spectrometer consists of eight triple-cryostats, each housing three n-type six-fold segmented HPGe crystals. Major structural changes were made to the cryostat and its electronics to facilitate usability and to increase longevity. The HPGe crystals are individually encapsulated in reusable thin-walled aluminium housing using a new technique that is based on a temperature resistant full-metal elastic seal. As each crystal provides seven signals from the core and six segments a MB cryostat requires 21 preamplifiers. The cryogenically-cooled part of the preamplifier consists of seven jFET-type field effect transistors with their feedback circuits and a coupling capacitor. These parts were improved and coupled to the AGATA preamplifier [1] board in the warm part of the cryostat providing a high bandwidth needed for pulse-shape analysis. First measurements with the new MB triple cluster detectors show energy resolution values and crosstalk properties well within the specifications. The new MB detectors will be employed for future experiments with radioactive ion beams at HIE-ISOLDE (CERN).

[1] S. Akkoyun, et al., Nucl. Instrum. Methods Phys. Res. A 668 (2012) 26

HK 68.3 Thu 16:45 HK-H4

Double-Gamma Nuclear Decay Experiments using Active Compton Supression — •Martin Baumann[1], Thomas Aumann[1,2], Michael Beckstein[1], Patrick Van Beek[1], Daniel Körper[2], Bastian Löher[2], Heiko Scheit[1], and Dmytro Symochko[1] — [1]Institut für Kernphysik, TU Darmstadt, Germany — [2]GSI Helmholtzzentrum, Darmstadt, Germany

The 4π Nai detector array Heidelberg-Darmstadt Crystal Ball has been upgraded with 16 LaBr3 detectors and a specially developed compton suppression system called BACCHUS. This made possible double gamma decay measurements with significantly reduced measuring time in comparison to previous experiments. Also the angular distribution between the two emitted photons can now be probed for a larger set of angles. The $\frac{11}{2}^- \rightarrow \frac{3}{2}^+$ transiton of 137-Ba is used as a benchmark to characterise the setup and evaluate future possible uses.
Supported by DFG (SFB 1245)

HK 68.4 Thu 17:00 HK-H4

Test measurement of the HISPEC plunger device at IKP Cologne — •Lisa Kornwebel[1], Christoph Fransen[1], Marcel Beckers[1], Andrey Blazhev[1], Alfred Dewald[1], Felix Dunkel[1], Jan Jolie[1], Casper Lakenbrink[1], Claus Müller-Gatermann[2], Franziskus von Spee[1], and Stefan Thiel[1] — [1]Institut für Kernphysik, Köln, Deutschland — [2]Physics Division, Argonne National Laboratory, IL, USA

The HISPEC plunger, developed and built by our group, is a core device for the HISPEC-DESPEC program which is part of the NUSTAR collaboration within FAIR. This device will be used for the measurement of level lifetimes in exotic nuclei at FAIR with the recoil distance Doppler-shift method. In order to prove the precision of this device, excited states of ^{181}Ta with well-known lifetimes were re-investigated in a test measurement with stable beam at the FN-Tandem accelerator facility at Cologne to determine absolute distances of the very large target and degrader foils in two perpendicular axes. We will present the results with respect to the foil parallelism and the repeat accuracy of these absolute distances. We will further relate the results to an independent measurement of the foil separations with an optical distance measurement system. This work was supported by the BMBF, grant No. 05P19PKFNA.