# HK 63: Instrumentation XIV

Zeit: Freitag 14:00–15:45 Raum: HS 12

**Gruppenbericht** HK 63.1 Fr 14:00 HS 12

**The ALICE TPC – past, present and future** — •Jens Wiechula for the ALICE-Collaboration — Institut für Kernphysik, Goethe-Universität Frankfurt

The ALICE time projection chamber (TPC) has been in operation for a decade. During the Run 1 and Run 2 data taking phase (2009-2018) it showed excellent performance, culminating in the Pb–Pb run in Dec. 2018. During the LHC long shutdown 2, which started directly after the Pb–Pb run, the MWPCs of the TPC will be replaced by a GEM-based readout system. This will allow for making full use of the 50 kHz Pb–Pb interaction rate which the LHC will deliver in Run 3 and Run 4.

Performance and challenges during the Run 1 and Run 2 data taking periods will be summarized. Also, the present status and the further planning of the upgrade program will be discussed.

Supported by BMBF and the Helmholtz Association.

HK 63.2 Fr 14:30 HS 12

**The development of a TPC-based focal plane detector for the MAGIX spectrometers** — •Sabato Stefano Caiazza for the MAGIX-Collaboration — Institute for Nuclear Physics, JGU Mainz

MAGIX is a versatile experiment which will be installed on the 105 MeV energy recovering beam line of the new MESA accelerator under construction at the Institute for Nuclear Physics in Mainz. The design of the experiment is based on two large spectrometers pivoting around the scattering chamber. The key components of those spectrometers are the detector which will track the scattered particles as they cross the spectrometers' focal planes. To achieve a high position resolution with electrons whose energy is lower than 100 MeV, we decided to rely on a pair of TPCs using which we can reduce the amount of passive material before the tracker to the amount necessary to separate the vacuum of the spectrometers from the counting gas of the detector sensitive volume. In this contribution we will present the most recent developments of those detectors and the plans for their future deployment

HK 63.3 Fr 14:45 HS 12

**Space-charge distortions in the ALICE TPC** — •Ernst Hellbär — Institut für Kernphysik, Goethe-Universität Frankfurt

The Time Projection Chamber (TPC) is the main tracking and particle identification detector of the ALICE experiment at the CERN LHC. With the advent of high luminosity data in LHC Run 2 (2015–2018), unexpectedly large local distortions of the drift paths of ionization electrons are observed at the edges of specific readout chambers. These distortions are caused by ions which originate at the readout chambers, leading to local space-charge accumulation in the drift volume of the TPC. Extensive studies have been performed to understand the exact origin of the space charge and the mechanism responsible for it. Along with this effort, a way to significantly mitigate the distortions has been found to achieve the best performance possible of the TPC in the latest heavy-ion run at the end of 2018.

Supported by BMBF and the Helmholtz Association.

HK 63.4 Fr 15:00 HS 12

**Performance of a twin position-sensitive Frisch-grid ionization chamber for photofission experiments*** — •M. Peck[1], U. Bonnes[1], J. Enders[1], A. Göök[2], J. Hehner[3], A. Oberstedt[4], and S. Oberstedt[2] — [1]Institut für Kernphysik, TU Darmstadt, Germany — [2]European Commission, Joint Research Centre, Geel, Belgium — [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany — [4]ELI-NP, Măgurele, Romania

Twin Frisch-grid ionization chambers (FGIC) [1] for the study of fission-fragment properties have been established as reliable detectors. Fission-fragment mass and energy distributions are determined using the double kinetic energy technique, the polar angle of the collinear fission fragments is determined from the drift time of electrons created by decelerating fission fragments in the counting gas. By exchanging the anode plates in the standard chamber on both sides by an array of grid- and strip-anodes, which are read out by means of resistive charge division [2], a position sensitivity is achieved that allows the azimuthal fragment emission angle to be determined, too [3]. The performance of a twin position-sensitive FGIC for future photofission experiments at ELI-NP has been studied using the well-known $^{252}$Cf(sf) decay. First results will be presented. *Supported by BMBF (05P2018RDEN9) and by the state of Hesse (LOEWE research cluster Nuclear Photonics).

[1] C. Budtz-Jørgensen et al., NIM A 258, 209 (1987).
[2] A. Pullia et al., IEEE Trans. Nucl. Sci. 49, 3269-3277 (2002).
[3] A. Göök et al., NIM A 830, 366-374 (2016).

HK 63.5 Fr 15:15 HS 12

**Electron Detection Efficiency of the CBM-TRD Prototypes in Testbeams at DESY** — •Adrian Meyer-Ahrens for the CBM-Collaboration — Institut für Kernphysik, Münster, Germany

The Transition Radiation Detector (TRD) is a part of the Compressed Baryonic Matter (CBM) experiment at FAIR. As electron identification is one of the TRD's main tasks, its electron detection efficiency is an important system property to be determined. For this and other testing purposes testbeam measurements with an electron beam at DESY were taken with current CBM-TRD prototypes in september of 2017. In this talk analysis results leading to the determination of the electron detection efficiency of the used prototypes will be presented. Since the detector prototypes and readout electronics were not yet tested in a large scale setup like the one used at DESY a focus of the analysis was also a general QA of the system. This work is supported by BMBF.

HK 63.6 Fr 15:30 HS 12

**CBM-TRD high-rate detector tests at the CERN-GIF** — •Philipp Kähler for the CBM-Collaboration — Institut für Kernphysik, Münster, Germany

The Compressed Baryonic Matter (CBM) experiment will be one of the research pillars of FAIR (Darmstadt, Germany), which is currently under construction. High-intensity heavy-ion beams delivered by the SIS100 accelerator (FAIR Phase 1) will be used to explore the QCD phase diagram at high net-baryon densities. At the planned interaction rates, the CBM experiment has to meet the challenge of very high hit rates in the detectors. This talk will focus on high-rate tests of the MWPCs for the CBM-TRD, which have been conducted at the CERN Gamma Irradiation Facility (GIF) in October 2018 using the near-to-final, self-triggered CBM-DAQ system. The detection efficiency for muons from CERN-SPS has been measured with respect to the detector load, applied using the 14 TBq $^{137}$Cs GIF source. First efficiency results will be shown as well as measurements on the high-voltage field of the MWPCs in load situations. This work is supported by BMBF-grant 05P16PMFC1.