T 47: Gas-Detecors, Detector Systems

Time: Tuesday 17:00–18:30 Location: WIL/A120

T 47.1 Tue 17:00 WIL/A120

First measurements with a gas monitoring chamber at subatmospheric pressures — Rebecca Fischer, Thomas Radermacher, Stefan Roth, David Smyczek, and •Nick Thamm — RWTH Aachen University - Physics Institute III B, Aachen, Germany

Time projection chambers (TPCs) are gaseous ionization detectors, which can instrument large volumes for particle tracking applications. By adjusting the internal gas-mixture and the operating pressure it is possible to fine-tune these detectors to have increased target mass for neutrino interactions or improved track resolution for low energies. For the precise operation of TPCs various electron swarm parameters are usually measured during runtime with a gas monitoring chamber (GMC), a small specialized TPC. These monitoring chambers can also be used for the verification of drift parameter simulations, which help predict the physics behavior of larger detectors. In this talk the hardware modification of a high pressure GMC (HPGMC) towards low pressure operation is addressed, the associated challenges are explained and first measurement results are shown.

T 47.2 Tue 17:15 WIL/A120

Development and Commissioning of Gas Flow Meters — Thomas Radermacher, Stefan Roth, David Smyczek, Jochen Steinmann, Nick Thamm, and •Hanja Wehrle — RWTH Aachen University - Physics Institute III B, Aachen, Germany

Gas flow meters will be installed in the new Gas Monitoring Chambers (GMCs) of the T2K time projection chambers. The flow meters measure the heat transfer caused by the gas flow using platinum resistors. This offers an efficient solution for monitoring the gas flow through the GMCs. The construction, calibration and performance of the flow meters are presented.

T 47.3 Tue 17:30 WIL/A120

Gas Monitoring Chambers for the T2K Near Detector Upgrade — Ines Hannen, Thomas Radermacher, Stefan Roth, •David Smyczek, and Nick Thamm — RWTH Aachen University - Physics Institute III B, Aachen, Germany

A new pair of Time Projection Chambers for high angle measurements (HATs) will be installed during the upgrade of the T2K near detector ND280. For their calibration the gas parameters will be continuously monitored using newly developed Gas Monitoring Chambers (GMCs). Systematic measurements of drift velocity and gas gain have been performed for different gas mixtures. These measurements are compared to simulations and previous measurements. The test setup and measurement results are presented.

T 47.4 Tue 17:45 WIL/A120

Commissioning of the large-scale LXe detector test platform PANCAKE — •Tiffany Luce — Physikalisches Institut, Universität Freiburg, 79104 Freiburg, Germany

As liquid xenon (LXe) detectors grow in size with each experiment, larger components have to be developed and tested. PANCAKE is a cryogenic detector test platform for components up to 2.6 m diameter as required for the future dark matter project DARWIN. PANCAKE's primary goal is to test the behavior of large scale detector components, such as TPC electrodes, in cryogenic conditions. A first commissioning run has been performed for two months at liquid argon temperature. The talk will present the results and discuss the strategy for future runs with cryogenic liquid xenon.

T 47.5 Tue 18:00 WIL/A120

Preparations for TPC Electrode Tests in a large LXe R&D-Platform — •Julia Müller — Albert-Ludwigs Universität, Freiburg

PANCAKE is a large-scale cryogenic platform to develop and test components for future LXe TPCs such as DARWIN. Over the past decades LXe TPCs continuously grew in size and became more sensitive, however, also the technical realization of its large TPCs got more and more challenging. Among the most crucial and also most complex detector components are the TPC electrodes, which need to feature a high optical transparency and high voltage resilience. PANCAKE allows testing the full-scale electrodes in an LXe-environment before they are installed into a final TPC. We here present preparations towards such an electrode test.

T 47.6 Tue 18:15 WIL/A120

Detector system and simulation of the 155 MeV Hydro-Møller polarimeter at MESA — •Michail Kravchenko for the P2-Collaboration — PRISMA+ Cluster of Excellence and Institute of Nuclear Physics, Johannes Gutenberg University Mainz

The Mainz Energy-recovering Superconducting Accelerator (MESA) is an electron accelerator, which is currently under construction at the Johannes Gutenberg University Mainz. One aim for the MESA is the precise measurement of the weak mixing angle $sin^2\theta_w$, an important parameter of the Standard Model, with a relative uncertainty of 0.14%. The measurement will be performed by the P2 experiment by measuring the parity-violating asymmetry in elastic electron-proton scattering at low momentum transfer Q^2. MESA will provide a 150 μA beam of alternatingly polarized 150 MeV electrons with excellent beam stability. In order to achieve the goal of the P2 experiment, the beam polarization must be measured online with a very low systematic error ($< 0.5\%$ relative). The 155 MeV Møller polarimeter using a polarized atomic hydrogen target, known as the Hydro-Møller polarimeter, as proposed by V. Luppov and E. Chudakov opens the opportunity for achieving these requirements. The current design of the detector system for the Hydro-Møller polarimeter and the results of the simulation with Geant4 are presented.