T 92: Detectors VIII (Gaseous Detectors)

Time: Friday 9:00–10:30 Location: VG 1.102

T 92.1 Fri 9:00 VG 1.102

Stability and Performance studies of upgraded Gas Monitoring Chambers for the T2K Near Detector — •Ziyan Cao, Stefan Roth, David Smyczek, Jochen Steinmann, and Nick Thamm — RWTH Aachen University - Physik Institute III B, Aachen, Germany

As part of the T2K ND280 near detector upgrade, Gas Monitoring Chambers (GMCs) are used to monitor key gas parameters such as drift velocity and gain, ensuring precise calibration of Time Projection Chambers(TPCs). This work focuses on evaluating the performance of upgraded GMCs with new features, including comparative analyses of drift velocity and gas gain with previous models and simulations. Observed discrepancies prompted systematic investigations into factors such as gas flow configuration, flow rate, and chamber stability. The results from testing the newly designed Micromegas will also be presented.

T 92.2 Fri 9:15 VG 1.102

Development of a novel GEM based neutron detector with VMM readout — •Jan Glowacz[1], Thomas Block[1], Klaus Desch[1], Saime Gürbuz[1], Jochen Kaminski[1], Markus Köhli[2], and Michael Lupberger[1] — [1]University of Bonn — [2]Heidelberg University

For the neutron science community the increase in price for Helium-3 has sparked the interest in detectors based upon solid neutron converters like Boron or Gadolinum. The boron based multi stage tracking detector (BASTARD) is a neutron detector, with a focus on high spatial resolution and high readout rates. It consists of a multi layer gaseous detector chamber with boron coated cathodes for neutron conversion. The boron captures the neutrons and decays into helium and lithium ions. The ions are detected with a high position resolution. The readout allows for rates of up to 10 Mhz and is realized with VMM3a hybrids via the RD51 Scalable Readout System. A prototype detector with an active area of 10cm x 10cm is being assembled. We plan to present our first experiences with it.

T 92.3 Fri 9:30 VG 1.102

A Straw Tracker Prototype for SHiP — •Wei-Chieh Lee, Caren Hagner, and Daniel Bick — Institut für Experimentalphysik, Universität Hamburg, Hamburg, Deutschland

SHiP (Search for Hidden Particles) is a general-purpose beam-dump experiment at the CERN SPS accelerator designed for the search of feebly interacting particles. In this experiment, the spectrometer straw tracker (SST) is located downstream of the hidden sector decay volume, and tracks the decay products of the hidden particles for the reconstruction of the decay vertex, the mass and the impact parameter of these particles. As the main component of the SST, straw tubes function as wire-based gaseous detectors that are robust and have little material budget for the purpose of minimizing multiple scatterings. The University of Hamburg is participating in the design and prototyping of the SST with the goal of optimization of the mechanical stability and the assembly strategy. In this presentation, a straw tracker prototype will be introduced with the plans of its future testing.

T 92.4 Fri 9:45 VG 1.102

Development of a straw-tube chamber prototype for the inner detector of a future e^+e^- collider experiment — •Julia Okfen, Davide Cieri, Francesco Fallavollita, Oliver Kortner, Sandra Kortner, Hubert Kroha, Giorgia Proto, Robert Richter, Elena Voevodina, and Jörg Zimmermann — Max Planck Institut für Physik

The future e^+e^- collider provides a unique opportunity for precision measurements of the Higgs boson and electroweak properties. The process $e^+ + e^- \to Z^* \to Z + H$ allows Higgs detection via the recoil momentum, independent of the Higgs decay modes. The precise momentum measurement of the Z-boson decay particles is crucial, requiring an accuracy at the level of 0.1% for $p_T \approx 50$ GeV/c, commensurate with the narrow spread of the center-of-mass energy. Such precision can only be attained using silicon sensors that offer position resolutions on the order of a few μm. However, gaseous-based technologies are essential for particle identification via dE/dx measurements along charged particle trajectories. To prevent a significant compromise of momentum resolution due to excessive multiple scattering, the detector material must be minimized. Straw tube chambers meet these requirements and add advantages: each unit operates independently, so a broken wire affects only one tube. They also offer flexibility in gas choice and volume instrumentation. This contribution will present a concept for an inner detector with straw tube and the design, production, and test of a straw-tube prototype chamber.

T 92.5 Fri 10:00 VG 1.102

Research and Development of an Inverted RICH Detector — •Daniel Grewe, Otmar Biebel, Valerio D'Amico, Stefanie Götz, Ralf Hertenberger, Eshita Kumar, Nirmal Mathew, Nick Schneider, Chrysostomos Valderanis, and Fabian Vogel — LMU München

In high-energy physics experiments, Ring Imaging Cherenkov Detectors (RICH) play an important role in identifying charged particles with known momenta. An inverted RICH detector takes a novel approach by reconstructing the momentum of a known particle through the measurement of its Cherenkov cone. A previous prototype employs a Lithium Fluoride (LiF) crystal to generate Cherenkov photons, which are converted to electrons via a Cesium Iodid (CsI) photocathode. The electrons are detected using a resistive strip Micromegas. While functional, this prototype requires further optimization. The CsI photocathode is highly sensitive to humidity, prompting the exploration of Diamond-Like Carbon (DLC) photocathodes as robust alternatives. To enhance the efficiency of detecting electrons generated in the photocathode, various counting gases are examined.

This talk will introduce the fundamental principles behind the inverted RICH Detector and highlight the latest developments in its prototype design, offering insights into the challenges and innovations shaping its evolution.

T 92.6 Fri 10:15 VG 1.102

Preparations for Upgrading the ND280 Gas Monitoring Chambers — Ziyan Cao, Stefan Roth, •David Smyczek, Jochen Steinmann, and Nick Thamm — RWTH Aachen University - Physics Institute III B, Aachen, Germany

A new pair of Time Projection Chambers for high angle measurements (HATs) have been installed during the upgrade of the T2K near detector ND280. To improve their calibration, the gas parameters will be continuously monitored using upgraded Gas Monitoring Chambers (GMCs). To upgrade the current Gas Monitoring Chambers several new features in hard and software have to be tested. These features include a new preamplifier, a new temperature controlled SiPM trigger and new readout software. These new features and results of their tests will be presented.