# T 38: Gasgefüllte Detektoren II

Zeit: Dienstag 16:30–18:45 Raum: Z6 - SR 2.002

T 38.1 Di 16:30 Z6 - SR 2.002

**Characteristics of a Diamond like Carbon Coated (DLC) Gas Electron Multiplier (GEM)** — •Amirrafiq Alfarra, Serhat Atay, Ivor Fleck, and Ulrich Werthenbach — University of Siegen, Siegen, Germany

Abstract

We are investigating in this work the characteristics of a diamond like carbon coated (DLC) gas electron multiplier (GEM). Both electrodes of this GEM were covered by a layer of diamond like carbon. The purpose of this coating is to reduce the probability of discharge and thus allowing us to increase the GEM voltage to reach higer gain. The DLC GEM is being operated in an Ar and CO2 gas mixture.The gain is being studied using x-ray radiation of Fe55 source at variate voltage and for different drift distances. Measurements are being taken using a pad readout system and compared with the results of CERN GEMs.

T 38.2 Di 16:45 Z6 - SR 2.002

**Characterization of The Ceramic GEM for The ILCTPC** — Amirrafiq Alfarra, •Serhat Atay, Ivor Fleck, and Ulrich Werthenbach — University of Siegen

The International Large Detector (ILD) will become one of the detectors of the International Linear Collider. A Time Projection Chamber, instrumented with Gas Electron Multipliers (GEM), could be constructed inside the ILD as the central tracking chamber. A new type of GEMs made out of ceramics are investigated. They have a thickness of 120 $\mu$m and a hole diameter of 200 $\mu$m. This talk will present the results from the characterization of these ceramic GEMs, especially for the properties as the gas gain and the long term stability. The results are also compared to the Garfield++ simulation. Gains of higher than 100 have been measured in an Ar:$CO_2$ (80:20) mixture after conditioning.

T 38.3 Di 17:00 Z6 - SR 2.002

**Spatial Resolution Enhancement for Micro-Pattern-Gaseous-Detectors** — •Bernhard Flierl[1], Otmar Biebel[1], Maximillian Herrmann[1], Felix Klitzner[1], Phillipp Lösel[1], Ralph Müller[1], and Andre Zibell[2] — [1]Ludwig-Maximilians-Universität München — [2]Julius-Maximilians-Universität Würzburg

The quality of position reconstruction of minimal ionizing particles using standard methods in planar gaseous detectors is often depending on the relative inclination of the particle track with respect to the detector. Different methods aim to overcome this by using time resolved readout in order to reconstruct the full track in a TPC-like scheme. We show a tracking method, which provides high spatial resolution together with excellent reconstruction efficiency at lowered requirements on timing resolution. At the example of small Gaseous-Electron-multiplier-detectors (GEM) with an active area of 100x100 mm$^2$ and square-meter sized micromegas detectors the resolution enhancement for multi-layer detectors is illustrated, which has been measured with a 150 GeV muon beam at the SPS accelerator at CERN. The detectors feature one- and two-dimensional strip read-out equipped with time-resolving APV25 chips, which allows a spatial resolution of below 0.15 mm independent of the track inclination.

T 38.4 Di 17:15 Z6 - SR 2.002

**Bestimmung der dE/dx Auflösung eines GEM-basierten TPC-Auslesesystems** — •Paul Malek für die LCTPC-Deutschland-Kollaboration — Deutsches Elektronen-Synchrotron DESY — Universität Hamburg, Institut für Experimentalphysik

Für den International Large Detector (ILD) am geplanten International Linear Collider (ILC) ist eine Zeitprojektionskammer (Time Projection Chamber, TPC) als zentraler Spurdetektor geplant. Um die nötige Spurauflösung zu erreichen, ist ein Gasverstärkungs- und Auslesesystem mit mikrostrukturierten Gasdetektoren (Micro Pattern Gaseous Detectors, MPGD) vorgesehen. Eine der untersuchten Möglichkeiten für die Gasverstärkung und Detektion sind Gas-Electron-Multiplier (GEM).

In diesem Beitrag werden Ergebnisse von Teststrahlmessungen mit einem modularen, GEM basierten TPC Auslesesystem vorgestellt. Der Schwerpunkt der Analysen lag auf der Messung des spezifischen Energieverlustes (dE/dx). Unter anderem werden die Abhängigkeit der dE/dx Auflösung von der Spurlänge sowie von Korrekturen der Ladungsmessung diskutiert.

T 38.5 Di 17:30 Z6 - SR 2.002

**Measurement of neutrino interactions in gaseous argon with T2K** — •Lukas Koch — RWTH Aachen University

The T2K near-detector, ND280, employs three large argon gas TPCs (Time Projection Chambers) for particle tracking and identification. The gas inside the TPCs can be used as an active target to study the neutrino interactions in great detail. The low density of the gas leads to very low track energy thresholds, allowing the reconstruction of very low momentum tracks, e.g. protons with kinetic energies down to O(1 MeV). Since different nuclear interaction models vary considerably in their predictions of those low momentum track multiplicities, this makes neutrino interactions on gases a powerful probe to test those models.

The TPCs operate with an argon-based gas mixture (95% by volume) and have been exposed to the T2K neutrino beam since the beginning of the experiment in 2010. Due to the low total mass of the gas, neutrino argon interactions happen only rarely, compared to the surrounding scintillator-based detectors. We expect about 600 such events in the recorded data so far (about 300 in the fiducial volume). We are able to separate those events from the background and thus demonstrate the viability of using gaseous argon as a target for a neutrino beam. This enables us to do a cross-section measurement on gaseous argon, the first measurement of this kind. All previous neutrino cross-section measurements on argon were performed in liquid argon TPCs.

T 38.6 Di 17:45 Z6 - SR 2.002

**Transverse Diffusion in the TPC of the T2K Near Detector** — Philip Hamacher-Baumann, Lukas Koch, •Thomas Radermacher, Stefan Roth, and Jochen Steinmann — III. Physikalisches Institut B, RWTH Aachen University

Transverse diffusion affects the spatial resolution in a Time Projection Chamber (TPC). In the TPCs of the T2K near detector it can be derived from the charge distribution on the MicroMeGaS plane. The electron cloud width is reconstructed from the charge fraction detected by the individual anode pads along the track. This cloud width depends on the drift distance between the point of ionization and the MicroMeGaS. From this the transverse diffusion coefficient can be extracted. Care has to be taken of the E-Field and B-Field inhomogeneities, because they can have an impact on the diffusion as well.

T 38.7 Di 18:00 Z6 - SR 2.002

**Study on the performance of thin-gap RPCs for the ATLAS muon spectrometer upgrade** — •Catriona Bruce, Oliver Kortner, and Hubert Kroha — Max-Planck-Institut für Physik (Werner-Heisenberg-Institut), München

Thin-gap resistive plate chambers (RPCs) make excellent muon trigger chambers in high radiation environments. The ATLAS experiment will equip the inner layer of its barrel muon spectrometer with thin-gap RPCs to increase barrel trigger acceptance from 78% to over 95%. The choice of operating voltage impacts the time resolution, spatial resolution, and efficiency and requires careful consideration prior to the final design decision. To this end, a full-sized prototype has been tested in a highly energetic muon beam at CERN. The presentation will summarize the conclusions about operating voltage and consequences for spectrometer performance.

T 38.8 Di 18:15 Z6 - SR 2.002

**Latest developments in improving the specific energy loss measurement in the Transition Radiation Tracker (TRT) at ATLAS** — Philip Bechtle, Klaus Desch, Christian Grefe, and •Philipp König — Universität Bonn

Particle identification (PID) is a crucial part for many analyses carried out at a particle physics experiment. One important observable for PID is the specific energy loss dE/dx. In addition, it is an interesting observable for searches for exotic particles as those particles can have a completely different energy loss behavior than known particles described in the Standard Model. In ATLAS, the dE/dx of charged particles is measured in the vertex detector and in the Transition Radiation Tracker TRT. The measurement of dE/dx in the TRT will be introduced and the latest improvements to this measurements will be discussed. In particular, this talk will focus on the measurement of dE/dx under different pile-up conditions, give an insight into different possible calibration techniques and discuss the separation of different particle types that can be achieved.

T 38.9 Di 18:30 Z6 - SR 2.002

**Cooling of the VMM3 readout ASIC** — Michael Lupberger[1], Hans Muller[1], Eraldo Oliveri[1], Leszek Ropelewski[1], and •Lucian Scharenberg[2] — [1]CERN, Geneva, Switzerland — [2]Physikalisches Institut, University of Bonn, Bonn, Germany

During the next long shutdown of the LHC an upgrade of the Muon system of the ATLAS detector is planned. Within this “New Small Wheel Upgrade” the VMM is developed as new front-end readout ASIC.

Due to its high rate capabilities and with its integrated digitisers, zero suppression, and programmable gain and shaping times the VMM is also interesting for other applications. In the gaseous detector community represented by the RD51 collaboration, the VMM is highly requested for becoming the next standard frond-end chip for their vastly flexible Scalable Readout System (SRS). Therefore the Gas Detector Development Group (GDD) at CERN, in cooperation with the European Spallation Source (ESS), implements the VMM into the SRS.

With a power consumption of about two Watts a lot of heat is transmitted to the carrier boards and detector frames, which could also affect the detection performance. Therefore the performance of the VMM depending on the temperature was measured with a dedicated constructed test set-up, which included temperature control and monitoring. With the results obtained it was possible to decide, if a passive cooling is sufficient or if an active cooling solution is required.

In this talk the functionality of the VMM and its implementation into the SRS, the test set-up and the results of the “VMM cooling project” are presented.