

FAKULTÄT für PHYSIK
LUDWIG-MAXIMILIANS-UNIVERSITÄT
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT
TECHNISCHE UNIVERSITÄT MÜNCHEN
MÜNCHEN/GARCHING

MLL-KOLLOQUIUM

Donnerstag, 20.12.2012, 16¹⁵ Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1
Treffen zum gemeinsamen Kaffee 16 Uhr

Dr. Bernhard Ketzer

(TU München, Physik Department E18)

A Time Projection Chamber for High Rate Experiments

A Time Projection Chamber (TPC) is a well-known detector for 3-dimensional tracking and particle identification for ultra-high multiplicity events. The necessity of an ion gate, however, restricted its application to low-rate experiments in the past. We have developed a novel amplification and readout scheme based on the Gas Electron Multiplier (GEM), which allows us to operate such a detector in a continuous readout mode without gating grid, and thus opens the possibility to employ a TPC in modern high-luminosity experiments. A prototype detector has been built, which is the largest GEM-TPC up to date. The detector has been commissioned with cosmics and particle beams at the FOPI experiment at GSI, and was employed for a physics measurement with pion beams.

Recently, the ALICE collaboration at the CERN LHC, operating the largest TPC in the world, has adopted our scheme for a major upgrade of their detector, with the goal of increasing the readout rate by about a factor of 100, and thus making it suitable for operation at increased luminosities after the second long shutdown of the LHC in 2018. As a first step, a prototype of an ALICE Inner Read-Out Chamber was equipped with large-size GEM foils at TUM and exposed to beams of protons, pions and electrons from the CERN PS.

In the talk, the results of Monte Carlo simulations as well as new measurements concerning the ion backflow, spatial and momentum resolution, the calibration of the GEM detectors, and dE/dx studies will be shown. An overview of the upgrade plans and the ongoing R&D for the ALICE TPC will be given.

gez. Peter Thirolf
Tel. 289-14064

gez. Norbert Kaiser
Tel. 289-12367