FAKULTÄT für PHYSIK
LUDWIG-MAXIMILIANS-UNIVERSITÄT
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT
TECHNISCHE UNIVERSITÄT MÜNCHEN
MÜNCHEN/GARCHING

MLL-KOLLOQUIUM

Donnerstag, 30.04.2015, 16^{15} Uhr

Seminarraum 127, TUM, Physik II, Erdgeschoss/Nord
Treffen zum gemeinsamen Kaffee 16 Uhr

Dr. Ioannis Giomataris

(CEA/Saclay, France)

Innovation in instrumentation and new physics

Micropattern gaseous detectors (MPGD) are widely used by many experiments and future projects. The high radiation resistance and excellent spatial and time resolution make them an invaluable tool to confront future detector challenges at the next generation of colliders. Some examples are particle and nuclear physics projects: COMPASS, CAST, LHC-B, TOTEM, RICH, NA48, CLOE, CLAS12G, n-TOF, ILC, T2K, ATLAS-sLHC, CMS-sLHC. Micromegas detectors have a large potential to be used as active detection devices for a large variety of industrial applications: X-Ray imaging, industrial fluorescence and crystallography, Positron Emission Tomography, Beta imager. Originally developed for the high-energy physics, applications have expanded to astrophysics, neutrino physics and dark matter search. I will present a fast review on principle and basic performance of Micromegas detector. I will point out new developments that are currently under way and especially novel industrial ways of fabricating the detector. The detector is used in CAST for solar axion search. The achieved low background level greatly improves the sensitivity of the experiment and suggests novel investigations. A new type of radiation detector based on a spherical geometry will also be presented. The detector consists of a large spherical gas volume with a central electrode forming a radial electric field. A small spherical sensor located at the center is acting as a proportional amplification structure. This new concept has been proven to operate in a simple and robust way and allows reading large volumes with a single read-out channel. It allows high gas gains to be reached and operates in a wide range of gas pressures. Sub-keV energy threshold with good energy resolution is achieved. Sub-keV energy threshold and versatility of the target (Ne, He, H) opens the way to search for ultra light dark matter WIMPs down to 100 MeV. I will present recent-promising results obtained with a low background spherical detector 60 cm in diameter installed at LSM underground laboratory. Background level at low energy is competitive with the best semiconductor detectors and there is room to improve it. Exclusion plots below 5 GeV are unique and open the way to search ultra-light dark matter particles. The sensitivity will be improved in the near future and ultimate results are expected from a 2 m detector at SNOLAB. Such a device would open the way to detect the neutrino-nucleus interaction, supernova explosions and perform other low energy neutrino studies.

gez. Peter Thirolf
Tel. 289-14064

gez. Norbert Kaiser
Tel. 289-12367