UNIVERSITÉ DE GENÈVE
FACULTÉ DES SCIENCES
Département de physique nucléaire et corpusculaire

SEMINAIRES DE PHYSIQUE CORPUSCULAIRE

SUJET : **Candidats au poste de MER**

DATE: Mercredi 18 juillet 2012
8h30 - 13h10

LIEU: **Auditoire Stückelberg**
24, quai Ernest-Ansermet, 1211 Genève 4

08h30-9h20 : ***Dr Chiara Casella (ETZH)***

From muon lifetime to positron emission tomography: Scintillators and photodetectors in precision measurements

The detection of scintillation light produced by ionizing radiation is certainly one of the oldest and still most widely adopted techniques in particle physics. Based on my personal experience, I will describe the experimental concepts and results of two different examples in this direction: the FAST and the AX-PET experiments.
FAST is a high precision muon lifetime measurement, aiming at a 2 ppm accuracy on the muon lifetime tμ. This is achieved with a DC p+ beam (170 MeV/c), stopped on a high granularity plastic scintillator target, viewed by position sensitive photomultipliers (PSPM).
AXPET is a prototype for a novel geometrical concept of positron emission tomography (PET), based on matrices of LYSO scintillating crystals read-out by Silicon Photomultipliers (SiPM), for the detection of 511 keV photons. It aims at a high spatial resolution (~ 1 mm3) in the reconstruction of the photons interaction point.
The working principle and the achieved results of the two experiments will be described.

09h20-10h10 : ***Dr Domenico della Volpe (Naples University)***

Unfolding New Physics at LHC

The most recent results on the Higgs discovery with the ATLAS detector will be presented.
The mechanisms to generate the masses of the particle in the frame of the Standard Model will be first introduced and then the recent observations will be presented and discussed.
The success of the measurement has depended strongly on the trigger system, which is fundamental to unfold the interesting physics process from the huge background from underlying collision events.
As this is is my current area of research activity, I will present the system's architecture and implementation and discuss the relevance for the measurement.

10h40-11h30 : *Dr Pedro Facal (U. of Chicago)*

The microwave technique for the study of the highest energy cosmic rays

The origin and composition of the ultra high energy cosmic rays (UHECRs, those with energies above 1018 eV) have been studied for long. Recent results by the Pierre Auger Observatory, a 3000 square kilometers hybrid detector with unprecedented sensitivity, have shed a light in some of the most pressing questions of the field, like the anisotropy in the arrival directions and the mass composition. But these results show also some of the limitations of the current techniques used for UHECR detection. Recent laboratory measurements suggest that detection of cosmic rays using microwave radiation in the GHz band is possible, and would allow to cover large areas, as needed, with 100% duty cycle and virtually no atmospheric attenuation. I will review the most recent UHECR measurements and present the current efforts towards GHz detection, in particular MIDAS, a prototype radio telescope instrumented with 53 microwave receivers at the University of Chicago.

11h30-12h20 : ***Dr Gerd Pühlhofer (Tübingen University)***

Hunting cosmic ray accelerators with TeV observations: Clues from dark TeV sources and Supernova remnants

TeV observations of the Galactic plane hold the promise of identifying the accelerators of Galactic cosmic rays. Indeed, current Cherenkov telescopes have found a rich population of Galactic TeV gamma-ray sources over the past few years. But identifying these gamma-ray sources with astrophysical objects often turned out to be challenging. I will report on lessons we learned throughout the identification process, with a particular emphasis on supernova remnants which are believed to be the main sources of Galactic cosmic ray particles.

12h20-13h10 : *Dr Giulio Saracino (Naples University)*

An application of Silicon Photomultipliers to a tracking detector for the muon radiography

Silicon Photomultipliers have been developed about ten years ago and their use, as an alternative to traditional photomultiplier tubes, is increasing more and more. They have single photon response capability, high detection efficiency, high gain at low bias voltage, low power consumption and very good timing performance. In spite of their Geiger regime, they can work as linear devices. All these properties motivated their adoption for a tracker designed for the muon radiography of volcanoes (muography).
Muography is a novel technique based on the measurement of the absorption suffered by cosmic muons while traversing the volcano's edifice. It can provide a density map of the upper part of a volcano with resolution better than 100 m. The detector is required to be able to work in harsh environment and to have low power consumption, good angular and time resolutions, large active area and modularity.
In this talk I will discuss the main properties of Silicon Photomultiplier and the design, construction and first measurements of the muon detector prototype developed for the MU-RAY project.

INFORMATION : http://dpnc.unige.ch/seminaire/annonce.html
ORGANISATEUR: Prof. Teresa Montaruli