

## LNGS SEMINARS

# Three seminars of visiting scientists from VIP Collaboration

**Pawel Moskal, Jagiellonian University - Kraków (Poland)**

**Title: Properties of positronium and its possible connection with imaging of the metabolic processes**

Abstract: Positron emission tomography (PET) is widely used to visualize the metabolic processes in the human body. Here, the process of the electron-positron annihilation into two high energetic photons is exploited. The Jagiellonian-PET using new detection technology from particle physics offers the possibility to efficiently detect, in addition, the three photons coming from the decay of the positronium in the symmetric states (ortho-positronium) and their polarisation eigenstates. We discuss the idea of detecting changes of positronium properties in the human body and we argue that the J-PET can be turned into a very sensitive facility for morphometric imaging of the living organisms.

**Johann Marton, SMI - Vienna (Austria)**

**Title: Experimental searches for the violation of spin-statistics and possible implications in physics**

Abstract: We shall discuss the spin-statistics connection, its origin and evolution, together with the experimental searches for its possible violation, presenting, in particular, some dedicated experiments performed at the Gran Sasso LNGS-INFN laboratory. We will then discuss the possible implications of spin-statistics violation in physics, starting from the quon-theory. The possible external motivations for violation of spin-statistics which will be mentioned include: violation of CPT, violation of locality, violation of Lorentz invariance, extra space dimensions, discrete space and/or time and noncommutative spacetime.

**Johann Zmeskal, SMI - Vienna (Austria)**

**Title: X-ray and gamma-ray detector systems for high precision measurements: I Silicon Drift Detectors and Transition Edge Sensors**

Abstract: We shall present the newly developed Silicon Drift Detectors for high precision X-ray spectroscopy, which were developed within the SIDDHARTA-VIP Collaboration, and the Transition Edge Sensors under development for extreme X and gamma-ray precision measurements. We shall discuss the technical characteristics of these detector systems and will present first measurements performed with them. Also, we will discuss possible applications for future experiments searching for rare events originating from Beyond Standard Model physics at the LNGS-INFN laboratory.

November 23, 2016 - 2:30 pm  
LNGS - "B. Pontecorvo" room