



CERN Joint EP/PP Seminars

SPEAKER: Prof. Peter GELTENBORT (Institut
Laue-Langevin, Grenoble)
TITLE: **Ultra-Cold Neutrons and Lifetime
Measurements at the Institut Laue-Langevin,
Grenoble**
DATE: Tue 13/05/2008 16:30
PLACE: Main Auditorium **

ABSTRACT

Due to their outstanding property to be storable and hence observable for long periods of time (several hundreds of seconds) in suitable material or magnetic traps, ultra-cold neutrons (UCN) with energies around 100 neV are an unique tool to study fundamental properties of the free neutron.

A brief introduction to the Institut Laue-Langevin (ILL) in Grenoble, France, which is a world leader in academic research with neutrons will be given. The scope of fundamental physics studies with neutrons is outlined. The main instruments provided for such studies are briefly introduced and some past and current flagship experiments with ultra-cold neutrons (UCN) in this field (electric dipole moment, quantum states) are highlighted.

The measurement of the lifetime of the free neutron is one of the important experiments in fundamental physics. Together with the determination of one of the correlation parameters characterizing neutron decay it allows tests of the Standard Model. Furthermore, the neutron lifetime plays an important role in Big-Bang Nucleosynthesis cosmology. Up to 180 s after the big-bang nuclei with more than one nucleon are unstable. The neutron lifetime determines how many neutrons have decayed up to this moment and hence the relative helium abundance in the universe. The different methods to measure the lifetime of the free neutron are reviewed and the latest experiments using storage of UCN at the ILL are described in detail.

Organised by: Maria SPIROPULU / PH -----** Tea
and coffee will be served at 16:00