



# CERN Joint EP/PP Seminars

SPEAKER: Aldo ANTOGNINI (Max Planck Institute for Quantum Optics, Garching, Germany / ETH, Zurich, Switzerland)

TITLE: **The Proton Radius Puzzle**

DATE: Tue 10/08/2010 11:00

PLACE: 222-R-001

## ABSTRACT

At the Paul Scherrer Institute, Switzerland, we have recently measured the  $2S - 2P$  transition frequency (Lamb shift) in muonic hydrogen ( $\mu p$ ) with 20 ppm precision by means of laser spectroscopy. From this measurement we have determined the rms charge radius of the proton. The new proton radius value  $r_p = 0.84184(67)\text{fm}$  is 10 times more precise than previously obtained. However, it disagrees by 5 standard deviations from the current CODATA value and 3 standard deviations from e-p scattering results. The origin of this discrepancy is not yet known. It may come from theory of the muonic hydrogen energy levels (used to deduce the new value), or from problems in hydrogen spectroscopy experiments or hydrogen energy level theory (both used to deduce the CODATA value), or from new physics. Experimental setup, measurements and results will be presented. Additionally the key issues regarding the observed discrepancy will be discussed. The discrepancy simply raises new questions in the muonic sector, in bound-state QED and around the proton, holding the potential for new insights

Organised by: M. SPIROPULU/G. UNAL/PH-EP..... Tea and coffee will be served at 10:30