

Journal Club



Thursday, July 2, 2015

301PSB

2pm-3pm: Yannis Semertzidis (KAIST)



A storage ring proton EDM experiment: the most sensitive CP-violation probe

Dedicated storage ring electric dipole moment (EDM) methods are under development with potential sensitivity of $1E-29$ e-cm for both the proton and deuteron nuclei. Two large collaborations, JEDI at COSY/Juelich and srEDM in the USA, are working closely to optimize the final experimental plan. Together with neutron EDM experiments, the proton and deuteron experiments can help shed light on the CP-violating source should one of them discover a non-zero EDM value.

The R&D program is well under way with work on hadronic polarimetry, spin coherence time optimization/benchmarking, electric field strength tests, and precision beam/spin dynamics. The COSY ring at Juelich is being used for several tests requiring stored polarized beams. The optimization tests are expected to be concluded within the next two to three years.

Storage ring EDMs are sensitive to new physics at the 1,000 TeV level, much beyond the reach of the LHC and they can provide a hint of the next interesting mass scale. If new physics is discovered at the LHC, the proton EDM will probe the CP-violating phases of this new physics at the sub-micro-radian scale, an unprecedented sensitivity level.

The all-electric proton storage ring favors a large bending radius and hence a large tunnel to minimize the strength of the radial electric field required to keep the 0.7 GeV/c momentum protons. Potential systematic errors originating from the so-called geometrical phases, wake-fields and the lattice impedance will be discussed.

3:00-3:20pm: Report by Themis Bowcock, Professor and Head of Particle Physics Group, U of Liverpool

EDM Planning at Liverpool

3:30-4:30pm: (Open) meeting of standing sub-committee on prospects for EDM measurement at Wilson Lab. (All present are welcome to participate.)