

Muon Capture on the Deuteron : The MuSun Experiment

Tuesday 10 September 2013 15:45 (15 minutes)

Basic few-body nuclear systems are increasingly understood in terms of QCD-based effective field theories (EFT). These calculations precisely predict electro-weak observables and establish rigorous relations between muon capture and fundamental astrophysical processes like p-p fusion and neutrino break-up of the deuteron. Experimentally, the muon capture rate on the deuteron tests this modern EFT description and determines the single, poorly known low-energy constant appearing in the two-nucleon sector. The MuSun experiment will achieve an order of magnitude improvement over previous measurements with the use of a cryogenic deuterium TPC target designed to be insensitive to muon atomic kinetics. The capture rate is measured via the lifetime of negative muons in deuterium, so it is critical to avoid decay-time-dependent event selection cuts. Data collected at the Paul Scherrer Institute in 2011 is being analyzed and the MuSun collaboration is implementing detector upgrades for a beam period in the fall of 2013.

Summary

A presentation of the progress of the MuSun collaboration's analysis of data collected at PSI in 2011 and the experimental upgrades leading up to the upcoming beam period in fall 2013.

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Session Classification: Tu - 3