

Abstract Submitted
for the APR11 Meeting of
The American Physical Society

Improved Measurement of the $pp\mu$ Molecular Formation Rate

SARA KNAACK, University of Illinois at Urbana-Champaign, MUCAP COLLABORATION — The MuCap experiment measures the μ^- lifetime in a gaseous hydrogen TPC to obtain the μp singlet capture rate Λ_S by comparing it to the free μ^+ lifetime. The motivation is a determination of the pseudoscalar coupling g_p of the proton, which relates linearly to Λ_S . A μ^- atom, formed after a muon stops in the TPC, can form molecular hydrogen at the rate $\lambda_{pp\mu}$, a process that competes with muon capture. Muon capture from the molecular state is slower than from the singlet state and $\lambda_{pp\mu}$ must be known to correctly extract Λ_S from the data. New results are reported on $\lambda_{pp\mu}$ based on data obtained using an argon-doped hydrogen gas, but under otherwise identical TPC conditions as the un-doped hydrogen data. Argon introduces additional atomic processes involving the muon, which are observed in the muon decay electron and the direct capture neutron time spectra. Fits to these data determine $\lambda_{pp\mu}$ to a precision that is a significant improvement to the current world average. New MuCap data will reduce $\delta\Lambda_S$ by a factor of two or more, making the improved measurement of $\lambda_{pp\mu}$ critical.

Sara Knaack
University of Illinois at Urbana-Champaign

Date submitted: 14 Jan 2011

Electronic form version 1.4