Abstract Submitted
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Determination of μd chemistry kinetic parameters for the MuSun Experiment[1] NANDITA RAHA, University of Kentucky — The MuSun experiment at PSI will measure the muon doublet capture rate Λ_d in ultra pure deuterium gas to 1.5% precision from the measured decay-electron time distribution. This reaction cleanly determines the strength of the two-nucleon weak axial current interaction. The kinetic parameters of the μd chemistry are essential for extracting Λ_d, which in turn are determined from the process of muon catalyzed fusion in deuterium. This process yields ^3He recoils and 2.45 MeV monoenergetic neutrons from the reaction $dd\mu \rightarrow {}^3He + n + \mu$. Encoded in the time dependence of the fusion products are the $dd\mu$ molecular formation rates from the $F = 1/2,\ 3/2$ hyperfine states (λ_d and λ_q) and the hyperfine transition rate (λ_{qd}) from the higher-energy $F = 3/2$ state to the lower-energy $F = 1/2$ state. This work concentrates on the analysis of the fusion neutrons, which are detected by an array of eight neutron detectors. Pulse shape discrimination was used to distinguish neutrons from background gamma rays. A least squared fit to the time spectrum of the fusion neutrons determines the μd chemistry kinetic parameters λ_{qd} and the ratio λ_q / λ_d.

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