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MuSun: Precision muon capture on the deuteron ETHAN MULDOON, University of Washington, MUSUN COLLABORATION — The MuSun experiment aims to measure the rate for muon capture on the deuteron to 1.5% precision. This will determine the strength of the weak coupling of the two-nucleon system, which is required to calculate fundamental processes of astrophysical interest such as solar p-p fusion and neutrino-deuteron scattering. The experiment measures the small shift in disappearance rate of muons in μ-d atoms relative to the known free muon decay rate, requiring on the order of 10 billion clean events to reach our precision goal. The experiment utilizes the π-E1 muon beamline at the Paul Scherrer Institute in Switzerland. Data collection is complete, with production campaigns in 2014 and 2015 recording approximately 12 billion candidate events. Data analysis is under way to address several unique challenges such as high chemical and isotopic target purity, muon beam related backgrounds, and the effect of muon-catalyzed fusion events. Although the capture rate is determined using muon decay electrons, direct measurements of capture and fusion neutrons provide a valuable resource for examining these systematic effects. Here we give an overview of the experiment, and discuss the path towards a high precision result.

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