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MuSun: a high precision measurement of the muon-deuteron capture rate DANIEL SALVAT, Univ of Washington, ON BEHALF OF MUSUN COLLABORATION — Muon capture on the deuteron is a weak two-nucleon process which can be related in a model-independent way to other processes of fundamental interest such as solar p-p fusion and neutrino-deuteron scattering. The MuSun experiment determines the disappearance rate of μ^- stopped in an ultra-pure deuterium target by measuring the time between the observed incident muons and their decay electrons. This rate is compared to the known μ^+ decay rate to determine the capture rate with a goal of 1.5% precision. The target operates as a time projection chamber, providing strict event selection by identifying muons within the target. The capture rate is 1000 times slower than free muon decay, demanding a ten ppm measurement of the decay rate, and thus $\sim 10^{10}$ events with careful control of systematic effects. We have acquired 1.2×10^{10} candidate events at the πE1 muon beam line at the Paul Scherrer Institute over two experimental campaigns. The experiment is a unique probe of the two-body weak current, and presents a number of challenges such as high target purity and identifying muon-catalyzed fusion events. Here we present the current status and recent analysis progress which will lead to a measurement of the capture rate to unprecedented precision.

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