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A New Measurement of the Muon Lifetime with the MuLan Experiment JOSH KUNKLE, University of Illinois at Urbana-Champaign, MULAN COLLABORATION — Following recent theoretical calculations, the uncertainty on the Fermi coupling constant is now limited by the precision with which the muon lifetime is measured. The current world average uncertainty on the lifetime is 17 ppm. The MuLan experiment is designed to measure the muon lifetime to 1 ppm. To supply muons, a periodic, pulsed muon beam is created. During a 5 μ s "fill period", muons are directed to a thin stopping target. A 22 μ s "measurement period" follows with the beam "off" while the stopped muons decay. A spherical detector surrounding the target detects the decay positrons. A wire chamber with a 10×10 cm window is used during beam tuning and for regular measurements during data production. An FPGA is used to enable fast readout of the wire chamber. The firmware that controls the FPGA allows for prescaling during the fill period to reduce the data rate. A number of scalar signals are produced that reflect the flux of muons in specific areas of the chamber. This firmware is currently being used in the 2006 data production run. I have been responsible for the FPGA firmware, as well as various analysis studies.

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