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MuLan; a precision measurement of the muon lifetime and determination of the Fermi constant

TIM GORRINGE, Univ. of Kentucky

The Fermi constant G_F determines the rates of weak processes that range from nuclear beta-decay to stellar nucleo-synthesis. At Paul Scherrer Institute, the MuLan experiment is seeking to determine the Fermi Constant by measuring the positive muon lifetime to an unprecedented precision of about one part-per-million - a twenty-fold improvement over earlier experimental efforts. The experiment uses an intense, pulsed, muon beam and a finely-segmented, fast-timing, scintillator array to record the decays of more than 10^{12} muons. In this talk we report the results for the positive muon lifetime from our 2004 production run, and describe our progress to reaching the final goal of one ppm. The implications - both as a determination of a fundamental constant of the electroweak interaction and for the precision testing of the standard model - are also discussed.