

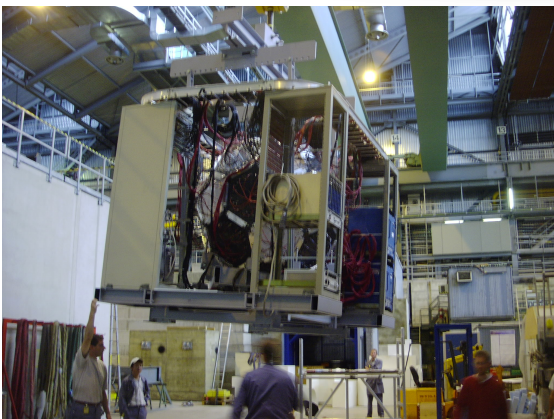
Journal Club

David Hertzog
University of Washington



Measurement of the Positive Muon Lifetime and Determination of the Fermi Constant to Part-per-Million Precision

I will describe the MuLan measurement of the positive muon lifetime to a precision of 1.0 ppm; it is the most precise particle lifetime ever measured. The experiment used a time-structured, low-energy muon beam and a segmented plastic scintillator array to record more than 2×10^{12} decays. Two different stopping target configurations were employed in independent data-taking periods. The combined results from each experiment---obtained following standard blinded-analysis techniques---agree to 0.3 +/- 2.1 ppm. Combined, they give $t_m = 2196980.3(2.2)$ ps, more than 15 times as precise as any previous experiment. The muon lifetime gives the most precise value for the Fermi constant: $G_F = 1.1663788(7) \times 10^{-5} \text{ GeV}^{-2}$ (0.6 ppm). It is also used in our sister experiment, MuCap, to extract the mu-p singlet capture rate, which determines the proton's weak induced pseudoscalar coupling g_p . I will also include the final results from this measurement.



Friday, Feb. 7, 2014
4:00pm

301 Physical Sciences Building
Refreshments, 3:45pm