MEASUREMENT OF THE NEUTRON LIFETIME BY COUNTING TRAPPED PROTONS

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The decay rate of the neutron is an important parameter in low energy weak interactions. In combination with other measurements, it determines one of the parameters of the Standard Model of elementary particle interactions (the KM matrix element V_{ud}). It also influences the predictions of the theory of Big Bang Nucleosynthesis for the amount of primordial helium in the universe and the number of different types of light neutrinos.[1] The goal of this collaboration is to perform a measurement of the neutron lifetime with an accuracy at the $0.1-0.2\%$ level. A previous version of the experiment reached an accuracy of 0.5%.[2]

The measurement is performed by confining the protons from in-beam neutron decays in a Penning trap and counting the trapped protons while simultaneously monitoring the absolute neutron flux passing through the trap. The experiment has been running for several months at the NIST Cold Neutron Research Facility. Approximately eight million decay events have been recorded to date. Data analysis is in progress. Work on the absolute calibration of the neutron flux monitor will continue both during and after the decay data have been taken.

1. M.S. Dewey, G.L. Greene, and W.M. Snow, *Proc. of the XII Moriond Conference*, ed. J. Tran Than Van (in press).
2. J. Byrne, *et al.*, Phys. Rev. Lett. **65**, 3 (1990).