DNP19-2019-000409

Abstract for an Invited Paper
for the DNP19 Meeting of
the American Physical Society

Polarized angular correlations in ^{37}K: Recent results from TRINAT[1]

DAN MELCONIAN, Texas AM University

Nuclear β decay has a long-standing history of shaping and testing the standard model of particle physics, and it continues to this day with elegant, ultra-precise low-energy nuclear experiments. Measurements of the (un)polarized angular correlations between the electron, neutrino and recoil momenta following nuclear β decay can be used to search for exotic currents contributing to the dominant $(V-A)$ structure of the weak interaction. Precision measurements of the correlation parameters to $< 0.1\%$ would be sensitive to (or meaningfully constrain) new physics, complementing other searches at large-scale facilities such as the LHC. This talk will discuss recent work from the TRIUMF Neutral Atom Trap (TRINAT) collaboration. We utilize neutral atom trapping techniques with optical pumping methods to highly-polarize ($> 99\%$) a very cold and localized (< 1 mK and < 1 mm^3) source of short-lived (~ 1 s) ^{37}K atoms. Recently, we measured the β asymmetry parameter, A_β, of this decay to 0.3%, the best relative accuracy of any β-asymmetry measurement in a nucleus or the neutron. These methods and recent results will be presented along with future prospects for improving the precision to $< 0.1\%$.

[1]Work supported by the US DOE Award No DE-FG02-93ER40773