

Neutron Beta Decay and the Weak Interaction

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The neutron has proven to be an excellent tool for studying all four of the fundamental forces of nature. Studies of the free neutron's decay to a proton, electron, and antineutrino can give us our most precise understanding of the charged weak interaction of quarks and allows us to search for hints of new physics and interactions missing from our model. The next generation of experiments to measure the lifetime and angular correlations in neutron beta decay faces significant challenges to push to even higher precision and stronger limits. I will give an overview of how some of the cutting edge experiments today are approaching these challenges, and discuss in detail the upcoming Nab experiment at the Spallation Neutron Source at Oak Ridge National Laboratory. The thick, large area silicon detectors used in Nab have excellent energy and timing resolution and position sensitivity and represent a significant advance for neutron beta decay measurements. Even greater sensitivity for Nab and other beta decay experiments could be achieved by implementing the very thin deadlayer silicon drift detectors in development by the TRISTAN project.