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The n3He experiment: A new era in Hadronic Parity Violation

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Parity violation (PV), first observed in semileptonic decays, has been determined precisely for quarks and leptons as part of the standard model. At the hadronic level, it offers a unique probe of nucleon structure and the underlying low-energy behavior of non-perturbative QCD. The hadronic weak interaction is characterized in terms of five spin and isospin dependent S-P transition amplitudes. There is an active program to determine these low energy couplings from hadronic PV observables using cold neutron beams at the Spallation Neutron Source (ORNL) and the NCNR reactor (NIST). These experiments are carried out in few-body observables, for which the nuclear wave functions are exactly calculable, but the effects are dominated by the strong interaction by seven orders of magnitude. The n3He experiment recently completed a measurement of the PV directional proton asymmetry with respect to the neutron spin in the reaction n + ³He -> p + ³H. We will report this result, which is sensitive to the ΔI = 0,1 transition amplitudes. This is a major milestone in the road to mapping out the spin and isospin dependence of the hadronic weak interaction.

Primary author: CRAWFORD, Christopher (University of Kentucky)

Presenter: CRAWFORD, Christopher (University of Kentucky)

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