Abstract Submitted
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A Transverse Resonant Neutron Spin Flipper[1] JUSTIN TOMEY, University of Kentucky — A radio frequency spin flipper (RFSF) was designed to quickly and efficiently reverse the polarization of a neutron beam. Pulsing the RFSF on and off makes it possible to compare reactions with spin "up" neutrons versus spin "down" on a pulse-by-pulse basis to reduce systematic errors associated with drifts in beam current and detector efficiency. It will be used in an experiment to measure the parity violating neutron spin asymmetry in the reaction n+^{3}He = ^{2}H+p with longitudinally polarized neutrons. The RFSF coil is designed with a double cos-theta pattern with current-carrying wire running down its length and end-caps. The transverse field allows for the manipulation of either transverse or longitudinal polarizations with almost 100% polarization, since the neutron sees no fringe field. It is a resonant spin flipper, based on the principle of nuclear magnetic resonance (NMR). It creates an oscillating magnetic field at the exact Larmor frequency of the neutron. In the rotating frame of the neutron's spin, it views the transverse magnetic field as static and precesses at exactly the rate needed to reverse direction entirely upon exit of the spin flipper.

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