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Measurements of polarization power of TUCANs UCN SCM polarizer and prototype spin analyzer

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The TUCAN collaboration is developing a new source of Ultracold neutrons (UCN) that will be used in a neutron Electric Dipole Moment (nEDM) experiment, with a goal sensitivity of 10^{-27} e*cm which is 10 times more precise than the best measurement to date. UCNs are neutrons with energies below 300 neV, that are travelling with speeds less than 30 km/h. In order to carry out a world-leading nEDM experiment, high densities of UCN need to be produced as well as precise measurements of the UCN polarization. Initially, we polarize UCN with a super conducting magnet (SCM). These UCN are then loaded into a pair of measurement cells with high E and B fields. In one cell the E and B fields are parallel and in one cell the fields are antiparallel. In the cell the UCN are subjected to a $\pi/2$ pulse, rotating their spin 90-degree to the fields. The rotated spins then free precess, after which they are then rotated back by a second $\pi/2$ pulse. The measured change in the final polarization state is related to a change in precession frequency. The difference of precession frequencies between cells related to a nEDM is then due to the differing directions of E-field direction. So final polarization state is the handle by which we measure an nEDM. In this talk I will discuss measurements of the SCM polarization power and the prototype spin analyzer components analyzing power, as well as simulations of these tests and relevant systematics.

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