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Recent advances in polarized 3He based neutron spin filter development WANGCHUN CHEN, THOMAS GENTILE, ROSS ERWIN, SHANNON WATSON, KATHRYN KRYCKA, QIANG YE, NIST - Natl Inst of Stds & Tech, NCNR NIST TEAM, UNIVERSITY OF MARYLAND TEAM — Polarized 3He neutron spin filters (NSFs) are based on the strong spin-dependence of the neutron absorption cross section by 3He. NSFs can polarize large area, widely divergent, and broadband neutron beams effectively and allow for combining a neutron polarizer and a spin flipper into a single polarizing device. The last capability utilizes 3He spin inversion based on the adiabatic fast passage (AFP) nuclear magnetic resonance technique. Polarized 3He NSFs are significantly expanding the polarized neutron measurement capabilities at the NIST Center for Neutron Research (NCNR). Here we present an overview of 3He NSF applications to small-angle neutron scattering, thermal triple axis spectrometry, and wide-angle polarization analysis. We discuss a recent upgrade of our spin-exchange optical pumping (SEOP) systems that utilize chirped volume holographic gratings for spectral narrowing. The new capability allows us to polarize rubidium/potassium hybrid SEOP cells over a liter in volume within a day, with 3He polarizations up to 88%, Finally we discuss how we can achieve nearly lossless 3He polarization inversion with AFP.

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