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New Methods for Understanding Precision in Spherical Neutron Polarimetry

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Spherical neutron polarimetry (SNP) is a powerful neutron scattering technique that can unambiguously determine complex types of magnetic order in materials such as chiral antiferromagnets, multiferroics, superconductors, and magnetoelectrics. Currently, four polarimeter designs exist worldwide and several instruments operate year round that utilize them. Of the three existing SNP designs, two have been developed for wide-angle, single crystal diffraction and they are known as CRYOPAD and MuPAD. The most recent effort in SNP development has been in North America producing CryoCUP and SANPA geared for small-angle neutron scattering applications. As the number of SNP instruments grows, the demand for high precision SNP measurements increases with it. Recently a new strategy for precision calibration of and SNP apparatus has be proposed. Preliminary results published this year in the development of SANPA at the NIST Center for Neutron Research suggest that a new high precision calibration method will yield a deeper understanding of neutron polarization manipulation in the laboratory environment and provide an improved method for comparing different SNP instruments. Here we will discuss an international effort to begin pushing the precision limit with existing SNP designs.

Summary

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