

Larmor labeling of neutron spin with superconducting magnetic devices

Conventional neutron scattering techniques encounter limitations when measuring scattering events characterized by small momentum or energy transfers due to the inherent trade-off between resolution and useable flux. To address this challenge, we explore the innovative utilization of neutron spin Larmor precession. By harnessing this phenomenon, it becomes possible to encode neutron momentum or energy changes as substantial shifts in the total Larmor phase, thereby circumventing the resolution-useable flux trade-off. This approach holds the potential to enhance the resolution of established techniques such as small angle neutron scattering, neutron diffraction, and inelastic neutron scattering. A pivotal element for effectively encoding neutron beams within the momentum-energy phase space is the magnetic Wollaston prism (MWP). In this conference, we introduce the advancement of superconducting MWPs and showcase their application in Larmor labeling of neutron spin. Through compelling demonstrations across various neutron scattering methodologies, we illustrate the transformative impact of this technique, opening new avenues for high-resolution investigations in neutron research.

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