

Visualizing the magnetic fields using polarized neutron imaging technique

In this work, we present a demonstration of performing polarized neutron imaging (PNI) at the beamline BL20 at Chinese Spallation Neutron Source (CSNS). Utilizing the V-cavity supermirror as the polarizer, the in-house developed in-situ polarized ^3He neutron spin filter (NSF) system as the analyzer, and an energy resolved neutron imaging detector, an aluminum cylindrical solenoid as a sample to generate a known magnetic field. Two dimensional polarized neutron images were produced from this PNI experiment. The observed oscillating behavior in the polarization wavelength dependence at specific areas of the sample is a proof of the precession of the neutron polarization vector around the magnetic field inside and beside the sample. The results of this work show the possibility of applying the PNI at CSNS for visualizing the magnetic field distributions within and around the magnetic materials and electric devices.

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