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Magnetic imaging method using pulsed polarised neutrons

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We have been developing a magnetic imaging technique using pulsed polarized neutrons at the Materials and Life Science Experimental Facility (MLF) of J-PARC. In this method, we visualize magnetic field distributions in free space or within a material using wavelength-resolved polarization distribution images. The neutron spin experiences Larmor precession in a magnetic field, and its precession angle depends on the neutron wavelength and field strength integrated along the neutron flight path. Since a change of the neutron spin direction can be detected as a change in the polarization degree, the polarization image at a specified wavelength gives the distribution of the magnetic field along the neutron beam trajectory. Moreover, the integrated field strength at each position in the image can be quantitatively evaluated by analyzing the wavelength dependence of the polarization degree. We constructed the polarization analysis system for neutron imaging [1] and performed some application studies at BL10 NOBORU and BL22 RADEN. In this presentation, we will describe the present status of our polarized neutron imaging method and show some experimental results of recent studies.

Reference

[1] T. Shinohara, *et al.*, J. Phys.: Conf. Ser. **862**, 012025 (2017).

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