

Activity in 2009 of Kinken Powder Diffractometer HERMES

K. Ohoyama

Institute for Materials Research, Tohoku Univ.

In 2009, 42 days were used as IRT experiments: experiments for substitute proposal: 16 days, experiments for IRT members; 18 days, and 8 days for maintenance.

A noteworthy result is that polarized neutron diffraction experiments are succeeded on HERMES with a ^3He spin filter method. We succeeded in observing flipping ratio of single crystal of Cu_2MnAl and Ni powder. In Fig.1, Flipping ratio of the 111 reflection of Cu_2MnAl single crystals obtained on HERMES. The effective polarization was about 15%; though this effective polarization was quite poor because of problems of connection of magnetic fields, this experiment was the first diffraction experiment with a ^3He spin filter in Japan. Since HERMES has wide observable Q range, polarised HERMES is quite suitable for investigations of magnetic diffuse scattering, in particular, ferromagnetic metallic glasses. Note that the He spin filter method is important for spectrometers in J-PARC as well as HERMES. In 2010, IRT has began polarized neutron diffraction experiments to observe magnetic diffuse scattering of magnetic metal alloys. This project is based on collaboration among KEK-JAEA-Tohoku Univ.

Another important development is practical application of high energy mode on HERMES. Rotating Ge 331 monochromator by just about 5° , user can use 1.1 Å neutron, which make it possible to observe up to 11A-1. By the high energy mode, IRT group has succeeded in observing magnetic reflections of ErB_2C_2 up to 9A-1, which gave whole information of magnetic form factor of Er^{3+} . This mode is quite useful for magnetic metallic glasses as well as observation of magnetic form factor.

In 2010, HERMES has a plan of upgrades; 1) installation of ^3He filter with laser

pumping system, which make it possible to obtain stable and high polarization beam, 2) installation of 20cm Ge monochromator, which gives about 1.7 times stronger beam flux, 3) installation of a slave machine for educational purpose.

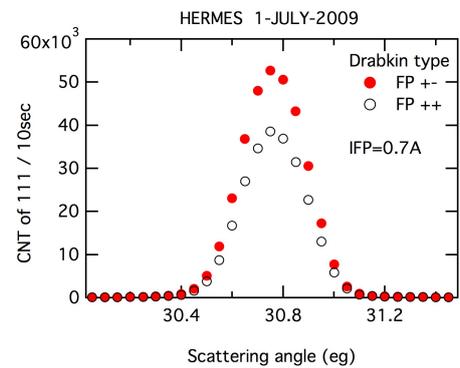


Fig. 1. Flipping ratio of 111 reflection of Cu_2MnAl single crystals obtained on Polarised HERMES