

High-resolution Magnetic Compton Profile of Iron

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A high-resolution magnetic Compton profile of ferromagnetic iron was measured with a momentum resolution of 0.14 atomic units. The results are compared with those obtained by FLAPW calculations [1].

Most of the magnetic Compton experiments have been performed with an energy dispersive spectrometer using a solid-state detector. With such detectors it is impossible to achieve a momentum resolution better than $\Delta p \sim 0.4$ atomic units. With a wavelength dispersive spectrometer, a higher resolution measurement can be performed. However, it usually takes a couple of weeks to acquire significant data sets. Therefore, there are only two reports of high-resolution magnetic Compton experiments [2, 3] in this decade.

A new setup of the Cauchois-type x-ray spectrometer for Compton scattering experiments installed on BL08W at SPring-8 allows us to perform high-resolution experiments within a reasonable beam time. This spectrometer employs an X-ray image intensifier as a position sensitive detector. Using this spectrometer, a high-resolution magnetic Compton profile of iron single-crystal was measured with a momentum resolution of 0.14 atomic units. The statistical accuracy is approximately 4% at $p_z=0$. The experiment shows a good agreement with the theoretical prediction [1].

[1] Kubo Y., Asano S., *Phys. Rev. B*, 1990, **42**, 4431. [2] Sakurai Y. *et.al.*, *J. Condens. Matter*, 1994, **6**, 9469. [3] Cooper M. J. *et. al.*, *J. Phys. Chem. Solids*, 2000, **61**, 512.

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