

# Measurement of Magnetic Compton Profile of Ferro- magnet Eu(Sr)O

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This is the first successful experimental proof that the relativistic Hartree-Fock (HF) 4f atomic orbital wavefunction[1] correctly reproduces the experimental 4f-orbital Compton profile. This evidence is one of inevitable base for the further application of Compton profiles to the study of magnetism. Hitherto, the most reliable evidence was good agreement between an experimental magnetic Compton profile (MCP) of Gd and a theoretical one, which is composed of a HF 4f-orbital Compton profile and an itinerant electron one[2,3]. Instead of Gd metal, the present MCP experiment has been carried out on Eu<sub>0.7</sub>Sr<sub>0.3</sub>O insulator, in which no itinerant electrons exist and only Eu-4f electrons have the magnetic moment.

The MCP was measured by using 271-keV [4] circularly polarized X-rays and a Ge solid-state detector as an energy analyzer. The top of the observed MCP is flat, which is a characteristic feature of the 4f-electron Compton profile.

Recently, Shutz et al.[5] has reported a preliminary results of MCP on single crystalline EuO. They observed the negative spin polarization in a low momentum region,

which may be explained by induced moments on the oxygen site. Contrary to their results, the present MCP shows no negative spin polarization in the low momentum region. This discrepancy cannot be ascribed to the present polycrystalline sample, because both the directional MCPs of EuO along [100] and [110] show the negative spin polarization in the low momentum region. It is thus interesting to investigate why the presence of Sr atoms, which are substitutional to Eu atoms, suppress the negative spin polarization of EuO.

## References

- [1] F. Biggs et al., Atomic Data and Nuclear Data Table, **16** (1975) 201.
- [2] N. Sakai et al., J. Phys. Soc. Jpn. **60** (1991) 1201.
- [3] T. Kubo and S. Asano, J. Magn. Mater, **115** (1992) 177.
- [4] Actually, a small amount of 267.5 keV X-rays was mixed to 271 keV ones with a ratio 1/11.8. The Yohan-type curved monochromator may be slightly distorted due to the ununiformity of compress to the bending holder.
- [5] Shutz et al., ESRF Users Report H383 (1998).