

凝縮系物理学ゼミナール

Condensed Matter Seminar

Location: Room 413, School of Science Bldg. 5 (理学 5 号館 413 号室)

Date: 13:30-15:00, Wednesday, 11 April 2012

Anomalous Hall effect in ferromagnetic metals at finite temperature

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Abstract:

The anomalous Hall effect in a multiband tight-binding model is numerically studied including the elastic scattering by disorder and the inelastic scattering at finite temperature much lower than the Curie temperature [1]. Motivated by the recent proposal in Fe films [2], we find a new scaling relation

$-\sigma_{xy} = \rho_{xy0}^{\text{ext}} \sigma_{xx}^2 + b$ to separate the extrinsic and intrinsic mechanisms, which tells that the former is rapidly suppressed by the inelastic scattering while the latter is robust. The other scaling relation $\rho_{xy0}^{\text{ext}} = \alpha \sigma_{xx0}^{-1} + \beta \sigma_{xx0}^{-2}$, which separates the skew scattering and side jump, holds only when the band is well-defined.

Reference:

[1] Atsuo Shitade and Naoto Nagaosa, arXiv:1109.5463.

[2] Y. Tian, L. Ye, and X. Jin, Phys. Rev. Lett. **103**, 087206 (2009).