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Hysteresis Design of Magnetic Materials for Efficient Energy Conversion

Tuesday, 15 March 2022, 9:00 s.t., UDE, Zoom



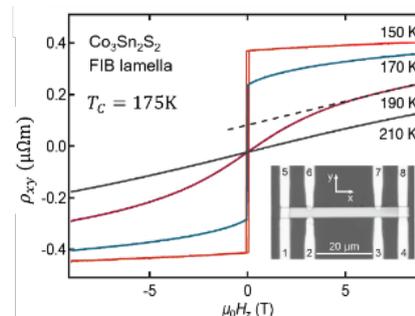
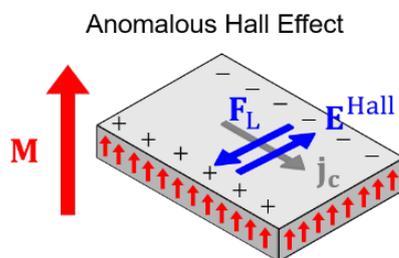
Prof. Dr. Sebastian Gönnenwein
Fachbereich Physik, Universität Konstanz

Zoom Information:
Meeting-ID: 844 4361 1855
Kenncode: 072062

Transverse Transport Experiments in Magnetic Nanostructures

Abstract:

About 140 years ago, Edwin Hall observed that a charge current flowing in a metal exposed to a magnetic field is accompanied by an electric field transverse to both current and magnetic field. This so-called Hall effect unambiguously shows that charge transport in solids must be described using a tensorial quantity (e.g., the conductivity tensor). Since similar arguments also apply to heat and spin transport effects in solids, today a rich variety of transverse transport phenomena is established and also exploited in applications. In the talk, I will first address charge-based transverse transport effects in magnetically ordered materials. More specifically, I will show that characteristic transverse 'Hall' electric fields can arise not only due to an externally applied magnetic field, but also from the internal magnetization or spin structure of a solid. These effects are referred to as anomalous Hall effect and topological Hall effect, respectively, in the literature. The second part of the talk will then be devoted to thermally driven transverse transport experiments, i.e., the anomalous and topological Nernst effects. I will show how transverse transport experiments allow probing the spin structure of individual magnetic nanostructures. Finally, I will touch upon transverse transport phenomena in antiferromagnets, which currently are very vividly studied.



About the speaker:

Since October 2020: full professor (chair for Modern Materials Science) at the Department of Physics, University of Konstanz, Germany
2016–2020: full professor (chair for Solid State Physics) at the Institute for Solid State and Material Physics, Technische Universität Dresden, Germany research focus: spin transport, spin caloritronics, spin dynamics and topological effects in magnetic thin films and nanostructures
2005–2016: research scientist at the Walther-Meißner-Institut, Germany deputy director of Walther-Meißner-Institut since 06/2014 Privatdozent at Technische Universität München since 02/2012
2003–2005: post-doctoral researcher at the Kavli Institute of NanoScience, Technische Universiteit Delft, The Netherlands.
1999–2003: PhD thesis Two-Dimensional Electron Gases and Ferromagnetic Semiconductors: Materials for Spintronics Walter Schottky Institut, Technische Universität München, Germany

Scientific outreach

- More than 145 publications in peer-reviewed journals h-index 47 (Web of Science, February 2022)
- Organization of the international workshop Spin Mechanics 3 (2015), the 510. Wilhelm und Else Heraeus-Seminar (2013), two student winter schools, as well as symposia and focus sessions at different international conferences

Awards and honors

- „Goldene Kreide“ (student's teaching award) for best bachelor-level physics lecture at TU München in the year 2015
- Arnold Sommerfeld-Preis der Bayerischen Akademie der Wissenschaften awarded December 6th, 2008

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