



Centre for Doctoral Training in Condensed Matter Physics

CDT-CMP Seminar Series

2:15pm Tuesday 29th November 2016

'Unconventional Transport in Unconventional Materials'

Dr. Martin Gradhand
University of Bristol

Over recent years more and more unconventional transport phenomena have been explored such as the Spin Nernst effect [1] and its magnetic analogue the anomalous Nernst effect [2]. As the thermoelectric equivalents to the, by now more conventional, anomalous Hall (AHE) and spin Hall (SHE) effect they share a similar problem. Despite the huge experimental and theoretical work, differences between the predicted and observed values in the Hall conductivities remain obvious. A major challenge in the theoretical description is the finite size of experimental setups including interfaces. After a brief review of these transport phenomena, establishing the relations between the different effects, I will shift the perspective of my talk slightly. Namely, can we exploit these spin-dependent transport phenomena to characterize more complex materials as for example, thin films, ternary alloys [3], and unconventional superconductors or charge density wave systems. I will present results on complex and unconventional materials where the Hall effects are used as probes of the underlying structure. This will include the time reversal symmetry breaking in unconventional superconductors as well as the chiral symmetry breaking induced by charge density waves. [4, 5]

- [1] K. Tauber, et al., PRB 87, 161114(R), (2013)
- [2] C. Herschbach, et al., PRB 90, 180406(R) (2014)
- [3] F. Töpler, et al. Phys. Rev. B 94, 140413(R) (2016)
- [4] M. Gradhand, et al., PRB 91, 060512(R), (2015)
- [5] M. Gradhand and J. vanWezel, Phys. Rev. B 92, 041111(R) (2015)

Room 3WN 3.8, University of Bath

If you would like to meet with the speaker before or after the seminar,
please contact cdt-cmp@bristol.ac.uk