



Birck Nanotechnology Center

Prospective Post-Doc Seminar

“Spin transport and spin-orbit torques in antiferromagnets”

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Abstract: Recent discoveries in antiferromagnets (AFs) such as spin-orbit torques, spin Seebeck effects and inverse spin Hall effects have opened up new possibilities for spintronics devices¹. Towards this end, by performing spin-torque ferromagnetic resonance measurements in AFs (PtMn, IrMn, PdMn, and FeMn)/Cu/Py (Ni₁₉Fe₈₁) trilayers, it has been demonstrated that Mn-based AFs have sizable spin Hall effects². However; in this previous work, a thin layer of Cu was used in order to eliminate the exchange coupling between the AFs and Py. Here, we removed the Cu interlayer and investigated a possible correlation between exchange bias and spin-orbit torques as the ferromagnetic/antiferromagnetic interface is crucial for both phenomena³. In addition, we investigated spin transport mechanism through these AFs by performing spin pumping and inverse spin Hall effects measurements in Py/AFs/W trilayers. We observe that there are two distinct transport regimes for transporting a spin current in the metallic AFs, which we associate with electronic and magnonic spin currents⁴.

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¹M. B. Jungfleisch et al., Phys. Lett. A. 382, 865 (2018).

²W. Zhang et al., Phys. Rev. B 92, 144405 (2015).

³H. Saglam et al., Phys. Rev. B 98, 094407 (2018).

⁴H. Saglam et al., Phys. Rev. B 94, 140412 (R) (2016).