

# Seminar: Hard Condensed Matter Theory

Room: Newton room, 01-122 (Staudinger Weg 9)

Time: Tuesday, 07.07.2015, 13:00

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## Phenomenology of Current-Induced Spin-Orbit Torques

Recent developments have shown that currents can cause magnetization torques via relativistic, intrinsic spin-orbit coupling, often referred to as spin-orbit torques (SOTs). A detailed understanding of the SOTs requires improved theoretical models that exceed the present phenomenological framework used to model current-induced magnetization dynamics. In this talk, I present a novel phenomenology of current-induced torques that is valid for any strength of intrinsic spin-orbit coupling [1]. In Pt|Co|AlO<sub>x</sub>, I demonstrate that the domain walls move in response to a novel relativistic dissipative torque that is dependent on the domain wall structure and that can be controlled via the Dzyaloshinskii-Moriya interaction. Unlike the non-relativistic spin-transfer torque, the new torque can, together with the spin-Hall effect in the Pt-layer, move domain walls by means of electric currents parallel to the walls.

[1] K. M. D. Hals and A. Brataas, Phys. Rev. B **88**, 085423 (2013).

**All interested are cordially welcome!**