Pozvánka na seminář oddělení 15

## V pátek 23. října 2015 v 10:00

v zasedací místnosti budovy A v Cukrovarnické

## Friday 23/10/2015 at 10am

in the meeting room, A building, Cukrovarnicka

Can Onur Avci (ETH Zurich):

# Interplay of charge, spin and thermal imbalances in normal-metal/ferromagnet bilayers

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Recent demonstrations of magnetization switching driven by current-induced spin-orbit torques (SOTs) have drawn considerable attention in the field of spintronics. The SOTs are associated with the spin Hall and interfacial effects, and have been found to occur in a variety of normal-metal/ferromagnet systems. A common way to measure current-induced torques is to perform harmonic measurements, i.e. injecting an ac-current to induce oscillations to the magnetization under the action of SOTs, and measuring the response of the system. To produce measurable torques, one needs to inject relatively high current densities ($j \sim 10^7$ A/cm$^2$) into the system, which unavoidably creates heating and temperature gradients. As a result, in all-electrical measurement schemes, due to charge, spin and thermal imbalances a variety of SOTs, thermoelectric and magnetoresistive effects/signals coexist and should be identified unequivocally. In light of the considerations listed above, I will present harmonic transverse (Hall) and longitudinal (magnetoresistance) measurements on a variety of normal-metal/ferromagnet systems with a special focus on Pt/Co, Ta/Co layers with in-plane magnetization. In the first part of my talk I will show a method to quantitatively measure SOTs and thermoelectric effects in a self-consistent way [1], which can be applied to both in-plane as well as perpendicularly magnetized layers. In the second part, I will discuss a new magnetoresistance effect (unidirectional spin Hall magnetoresistance) that we have recently discovered in the layers mentioned above [2], which is driven by the GMR-like interaction of the interface spin accumulation and the magnetization.

[1] Avci et al. Phys. Rev. B 90, 224427 (2014)
[2] Avci et al. Nature Phys. 11, 570 (2015)