

European School of Magnetism 2015

Theory of spin transport phenomena in magnetic tunnel junctions (1.5h)

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The lecture will be devoted to quantum theory of spintronic phenomena in magnetic tunnel junctions (MTJ) with non collinear orientation of magnetizations. The concepts of spin current tensor and corresponding spin transfer torques (STT) will be introduced and discussed in the framework of different approaches including free electron and tight-binding models. The properties of in-plane (parallel) and out-of-plane (field-like) components of spin transfer torques as a function of applied bias, barrier thickness and distance from the interface in the free layer will be established. The relation between the equilibrium field-like component of the spin transfer torque and interlayer exchange coupling (IEC) between magnetizations of ferromagnetic layers across an insulating spacer comprising the magnetic tunnel junction will be demonstrated. The properties of STT and IEC as a function of MTJ structural and material composition asymmetry will be discussed.

References:

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