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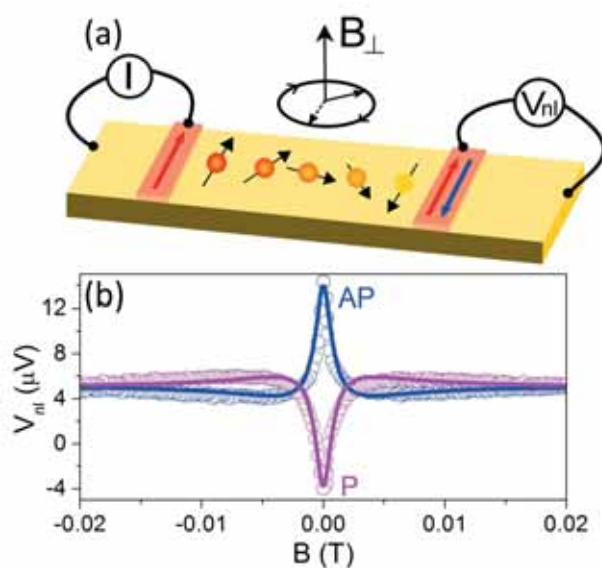
Generation and detection of spin currents in ferromagnetic/non-magnetic semiconductor structures

physikalisches

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Conventional electronics relies on manipulation of charge currents to provide various functionalities of electronic devices. The main objective of the novel field of spintronics, on other hand, is to take advantage of the spin of electrons and to explore different ways of manipulating spin currents in order to extend the functionalities offered by conventional devices. One of the main methods of generating a spin current in a nonmagnetic material is electrical injection of spins from a ferromagnetic source.

In this talk I will address main issues related to electrical spin injection and detection in semiconductors, illustrating it with the results of our experiments on GaAs-based structures. Our experimental investigations were mostly focused on all-semiconductor devices with a canonical ferromagnetic semiconductor (Ga,Mn)As employed as a source and a detector of injected spins. I will discuss some features relevant specifically to this particular system, like e.g. its spin injection efficiency, as well as more general aspects, namely discrepancies between the measured spin signals and predictions of the standard model of spin injection.



(a) Precession of in-plane spins injected into a lateral channel in a presence of an out-of-plane magnetic field.

(b) Resulting oscillations of the nonlocal voltage in case of the parallel (P) and the antiparallel (AP) orientation of magnetization vectors in injector and detector contacts.