
HL 1: Tutorial on Semiconductor Spintronics

Time: Sunday 14:00–17:00

Location: H1

Tutorial HL 1.1 Sun 14:00 H1
Theory of semiconductor spintronics — •J. KÖNIG — Ruhr-Universität Bochum, D-44780 Bochum

Spintronic devices rely on exploiting the spin degree of freedom of charge carriers. Spintronics in semiconductors seems particularly attractive since the charge-carrier properties can be controlled by doping and/or electric fields. In this lecture, we will give an introduction to basic concepts of semiconductor spintronics, with a special emphasis on the theory of spin dynamics in semiconductors.

Tutorial HL 1.2 Sun 15:00 H1
Spin dynamics and coherence in semiconductors — •DAVID AWSCHALOM — University of California, Santa Barbara, CA

The ability to optically measure coherent ensembles of spin polarized carriers in semiconductors has enabled numerous advances in spintronics and quantum information processing. Optoelectronic experiments reveal new capabilities of generating spin polarization through

all-electrical means without magnetic materials or external magnetic fields. We will provide an overview of optical studies exploring spin dynamics and coherence in conventional and magnetically-doped semiconductors, followed by recent measurements probing the all-electrical generation, transport, and manipulation of spins. These include current-induced spin polarization, the spin Hall effect, and gigahertz control of single spins.

Tutorial HL 1.3 Sun 16:00 H1
Spin + Electronics = Spintronics — •DIETER WEISS — Universität Regensburg

In electronics all information is carried by the elementary charge of electrons. In addition the electrons' spin degree of freedom is at the very heart of spintronics. In my presentation I will review some of the basic concepts to achieve spin dependent electrical transport. Special focus will be on spin dependent transport in or through semiconductors.