



Sonderforschungsbereich TRR 160

Kohärente Manipulation wechselwirkender Spinanregungen
in maßgeschneiderten Halbleitern

Seminarankündigung

Donnerstag, 24.10.2019, 12:00 Uhr
P1-02-110

**“Optical excitation of coherent magnons in an easy-plane
antiferromagnet”**

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Abstract:

Recent experiments show that ultrafast radiation at energies below the optical gap can create coherent magnetic excitations in Mott insulating antiferromagnets. In this talk, we introduce a quantum theory for the interaction of a (classical) light field with the magnetic degrees of freedom in the paradigmatic two-dimensional antiferromagnet Sr₂IrO₄.

The reduced space group symmetry of the crystal allows for several channels for spin-operator bilinears to couple to the electric field.

Integrating out high-energy degrees of freedom in a Keldysh framework, we derive induced effective fields which enter the equations of motion of the low-energy mode of in-plane rotations which couple to the out-of-plane magnetization. Considering a pump-probe protocol, these induced fields excite magnetization oscillations which can subsequently be probed, e.g. using Kerr rotation.

We discuss how the induced fields depend on polarization and frequency of the driving light, and our study applies to both resonant and non-resonant regimes. Crucially, the induced fields depend on the two-magnon density of states, thus allowing for further insight into properties of the magnetic excitation spectrum.