



Experimentelle
Physik 2

Seminar Festkörperphysik (CMP Seminar)

Aktuelle Probleme der Festkörperphysik für Studenten und Mitarbeiter
020236 Kolloquium/Seminar SS 26

Vorlesungszeit: 16.04.2026 – 16.07.2026

Thursday, 16.07.2026

12:10 – P1-02-110

Chiral phononics: A new approach to angular momentum in solids

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Chiral phononics is an emerging field that utilizes the angular momentum of circularly polarized lattice vibrations to manipulate the properties of materials. Intriguing discoveries of novel phenomena have included phononic analogues of spintronic and orbitronic effects, as well as the generation of atomistic tesla-scale magnetic fields that promise unprecedented control of magnetic order. In this talk, I will introduce general directions in the field and then present our recent predictions of novel physical mechanisms. Specifically, I will present a theory for the phonon angular momentum Hall effect that induces a transverse angular-momentum current and accumulation, resembling a phononic analogue of the spin and orbital Hall effects for electrons. I will further show how chiral-phonon scattering leads to a rotational analogue of the Umklapp process in solids, demonstrating the conservation of crystal angular momentum.