

NTML(BRL)-APCTP SEMINAR SERIES

Berry Phases and Non-linear Optoelectronic Phenomena

Dr. Inti Sodemann

Max Planck Institute for the Physics of Complex Systems

September 10th (Fri.) 16:00 (KST)

ZOOM Webinar

I will review a series of novel non-linear transport and optical phenomena that arise from the interplay of the electronic Berry phases in Bloch bands. I will begin by describing the non-linear Hall effect and the notion of the Berry curvature dipole emphasizing its interpretation as a non-linear counterpart to the Drude weight. I will highlight some of the most spectacular manifestations of these phenomena that have not been experimentally observed yet. This will lead us to discuss the quantum rectification sum rule: a new sum rule for the rectification conductivity of time reversal invariant materials that includes low frequency intra-band contributions and also inter-band optical contributions from shift currents. Finally, I will describe a new non-perturbative regime of optically driven current rectification, known as the Rabi regime. The photocurrent current in this Rabi regime becomes independent of the relaxation rate of photo-carriers and is determined only by the ideal band structure. I will present estimates to propose that this regime is within experimental reach in nodal Weyl semimetals.

■ ZOOM Webinar

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