



Sonderforschungsbereich 1277

Emergent Relativistic Effects in Condensed Matter -
From Fundamental Aspects to Electronic Functionality



SFB – Seminar

Speaker: **Lorenzo Gatto**
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Date: Monday, 20 June 2022, 14.00h, PHY 9.2.01

Topic: Charge carrier - phonon dynamics in semiconductors
probed by time-resolved terahertz spectroscopy

Abstract:

I will present the latest results obtained in the terahertz spectroscopy lab, recently developed in the Ultrafast Dynamics in Matter group shared between CNR and Politecnico di Milano.

I will focus on materials of interest for photonics and nanoelectronics like metal-halide perovskites and transition metal dichalcogenides (TMDs).

We used time-resolved terahertz spectroscopy, in combination with complementary characterization techniques, to probe the effects of a low-temperature (180 °C) annealing on evaporated CsPbBr₃ thin-films. Our results suggest that the lattice reorganization, induced by this fabrication protocol, leads to a different charge carrier-phonon coupling and to an increased contribution of non-radiative recombination channels.

Furthermore, I will discuss how the presence of low-frequency interlayer phonons in layered TMDs can represent a limiting factor for the mobility of the charge carriers. We probed IR-active low-frequency (< 65 cm⁻¹) vibrational modes in liquid-exfoliated tri-layer MoS₂ and we investigated their coupling with photoinjected charge carriers.

Host: Prof. Dr. Rupert Huber