

Ultrafast dynamics in 2D and quantum materials

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Soutien / labellisation : GDR Ultrafast Phenomena, GDR MEETICC

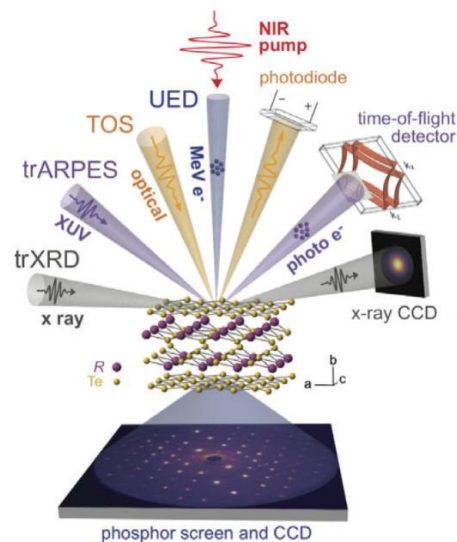


Figure: Ultrafast techniques accessing the degrees of freedom of a given material (taken from PRL 123, 097601 (2019)).

In the past decades, a new category of condensed matter systems has attracted significant attention: **quantum materials** such as superconductors, multiferroics, model materials with topological/semiconductor/magnetic/metallic phases, etc. These materials are characterized by intriguing phase coexistences and strong phase competitions. Among these systems, **2D materials** recently present fascinating properties stemming from their reduced dimensionality and offer a tunable platform, e.g. when combined in van-der-Waals heterostructures.

The advent of **ultrafast dynamics** research offered a novel, fruitful approach to access the phases, to understand the couplings between different degrees of freedom, and to control properties of quantum materials. Specifically, ultrafast light excitation as a contact-free access point promises a significant leap forward, toward this understanding and subsequently the engineering of devices with on-demand functionalities.

This mini-workshop brings together both **experimentalists and theorists** investigating **sub-nanosecond dynamics in 2D and quantum materials** to establish the current state-of-the-art of the community. The topics of the workshop include the ultrafast excitations of charge-carriers, excitons, charge-density-waves, phonons, spins and phase transitions to study correlated phenomena and out-of-equilibrium states, in 2D materials, heterostructures and quantum materials. Experimental techniques cover the full wavelength range from THz to X-ray, spanning from table-top to large scale facilities experiments, possibly taking advantage of secondary sources such as High order Harmonic Generation or electron bunches.