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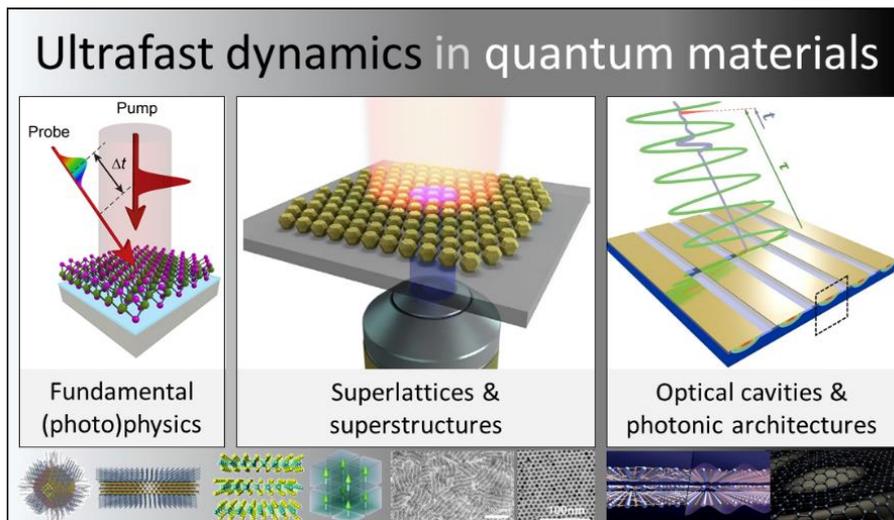
SD02 : Ultrafast dynamics in low-dimensional materials, colloidal nanostructures, superlattices and cavities

Organizers: Luca PERFETTI (LSI), Elsa CASSETTE (LuMIn), Sarah HOVER (MPQ)

Invited Speakers: Jacek KASPRZAK (Néel, Grenoble), Niloufar NILFOROUSHAN (MPQ, Paris) Akshay RAO (Cavendish lab., Cambridge)

Sponsors: GDR Ultrafast Phenomena (**UP**), GDR Horizon 2D et Hétérostructures (**2D+**)

Content:



Quantum materials—particularly **low-dimensional semiconductors**—continue to attract growing interest and remain the focus of intensive research efforts. This enthusiasm is fueled by the wide range of possibilities enabled by their enhanced light–matter interactions and the tunability of their electronic or optical properties. Understanding their rich (photo)physics often requires probing **dynamical processes** occurring of electrons, ionic lattice and spins on the (**ultra**)fast timescales, using pump–probe spectroscopic tools or fast-detection instrumentation, as well as developing state-of-the-art theoretical methods. In this mini-workshop, we will explore real-time electron and lattice dynamics across a broad class of materials, including transition-metal dichalcogenides, oxides, and hybrid compounds. We also aim to address **collective phenomena**—such as magnetically ordered states, multiparticle condensates, and dipole–dipole coupling leading to emerging superradiance. Particular emphasis will be placed on reduced-dimensionality effects in **2D materials**, **colloidal nanostructures** (quantum dots and 2D nanoplatelets), **superlattices**, as well as on light–matter interactions within **optical cavities and photonic architectures**.