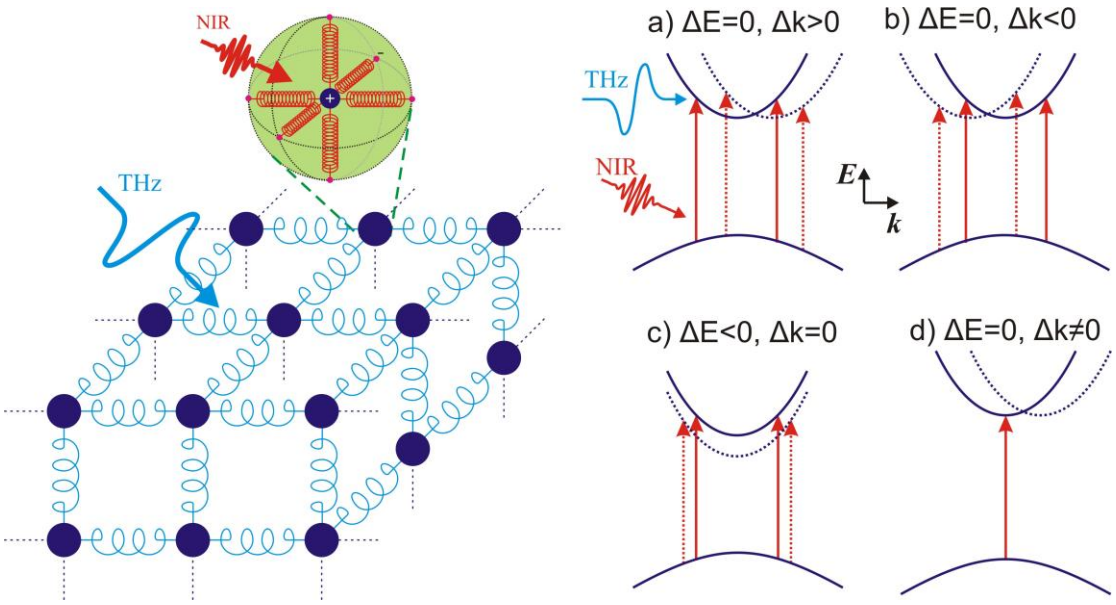
Intense THz pulses directly excite acoustic phonons



[LOW FREQUENCY MODES DIRECTLY EXCITED BY INTENSE THZ PULSES]

In: “Direct acoustic phonon excitation by intense and ultrashort terahertz pulses”, [J.-M. Manceau, P. A. Loukakos and S. Tzortzakis, Appl. Phys. Lett. **97**, 251904 (2010)], we report on time-resolved experiments where we employ intense, single cycle THz pulses to directly and resonantly excite (pump) coherent lattice modes. We then follow the lattice dynamics by monitoring the transient transmission changes of an optical pulse (probe) tuned to the interband transition. Our detection approach is based on a single photon (linear) process that does not require high intensities that could lead to unwanted nonlinearities, no phase matching restrictions apply and there are no limitations in the temporal resolution imposed by narrowband sources typically used in Raman-like processes. This constitutes a first step towards the longstanding goal of defining preferential pathways in chemical and biological reactions and thus gaining control over them.