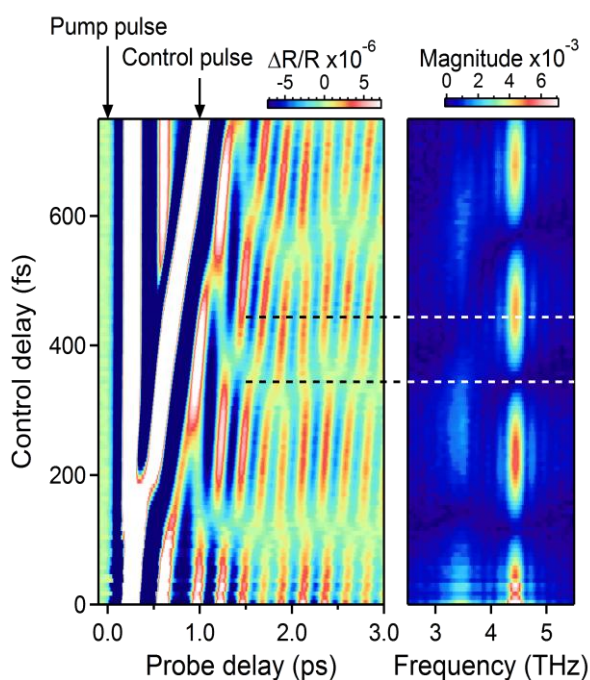
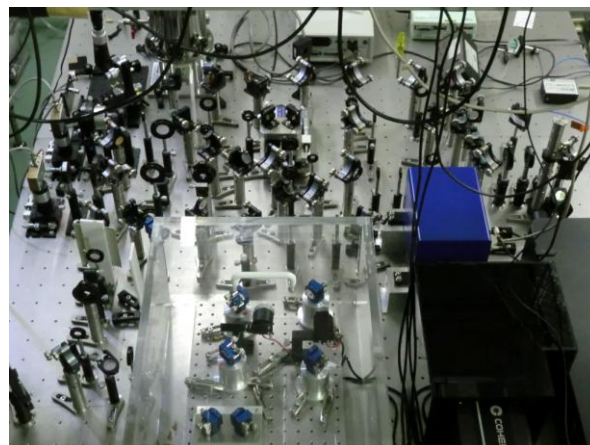


Ultrafast dynamics and coherent control in condensed matter

Dynamics of electrons, phonons, and elementary excitations, which dominate physical properties of materials, occur within a short time scale faster than nanoseconds. We have been investigating ultrafast dynamics of carriers, spins, phonons, and other quasi-particles in picosecond and femtosecond time scales using ultrafast time-resolved spectroscopy and X-ray diffraction. Macroscopic quantum states of phonons such as coherent and squeezed states have been extensively studied on semiconductors, superconductors, and ferroelectric materials. We also perform a coherent control of quantum states in condensed matter to optically control physical properties using precisely controlled femtosecond laser pulses and study the quantum decoherence.



Optical control of coherent phonons in $\text{YBa}_2\text{Cu}_3\text{O}_{7-d}$



Femtosecond time-resolved optical measurement system