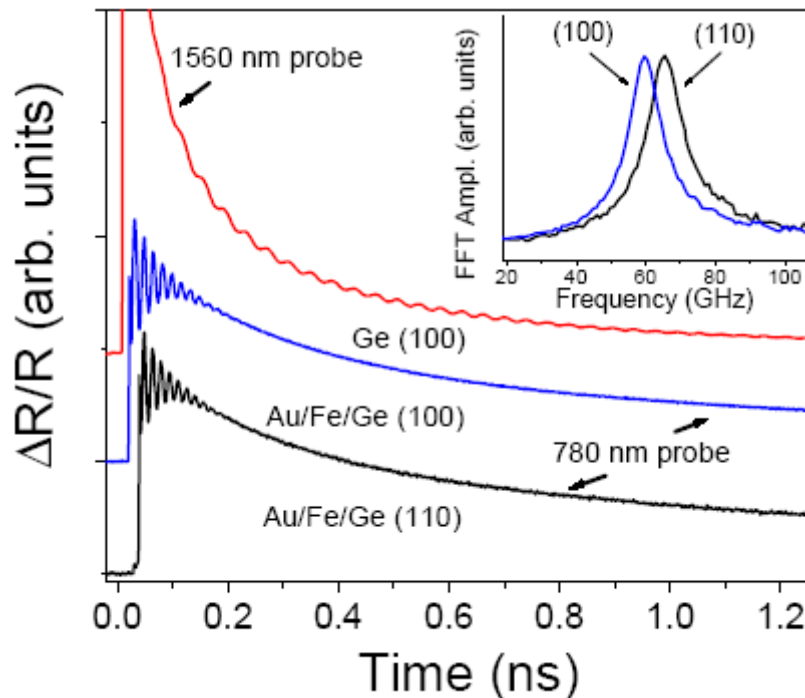


# Connecting disparate time-scales: the long and the short of it

Stoica *et al.*, Wideband detection of transient solid-state dynamics using ultrafast fiber lasers and asynchronous optical sampling, *Optics Express* 16, 2322 (2008).

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Condensed matter systems exhibit excitations (optical phonons, acoustic transients, spin waves, etc.) with different characteristic time scales which are often difficult to separate. We have devised a new approach for optical time-domain spectroscopy, from femtoseconds to nanoseconds, using an ultrafast dual-fiber-laser system with kilohertz continuous scanning rates. Using different wavelengths for the pump and probe beams, we exploit this system's exceptional temporal dynamic range for quantitative studies of thermal transport and the detection of coherent spin and lattice excitations in epitaxial magnetic thin films. We are able to connect fast and slow timescales in the observation of dissipation and decoherence processes.



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