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Title:Simultaneous time and wavelength resolved spectroscopy under two-colour near infrared and terahertz excitation
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Abstract:Time and wavelength resolved spectroscopy requires optical sources emitting very short pulses and a fast detection mechanism capable of measuring the evolution of the output spectrum as a function of time. We use table-top Ti:sapphire lasers and a free-electron laser (FEL) emitting ps pulses as excitation sources and a streak camera coupled to a spectrometer for detection. One of the major aspects of this setup is the synchronization of pulses from the two lasers which we describe in detail. Optical properties of the FEL pulses are studied by autocorrelation and electro-optic sampling measurements. We discuss the advantages of using this setup to perform photoluminescence quenching in semiconductor quantum wells and quantum dots. Carrier redistribution due to pulsed excitation in these heterostructures can be investigated directly. Sideband generation in quantum wells is also studied where the intense FEL pulses facilitate the detection of the otherwise weak nonlinear effect.
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