39) Topic: Terahertz nonlinearities in semiconductor nanostructures

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Abstract: While nonlinear properties of materials are well known and explored in the visible/infrared spectral region, knowledge about the nonlinear response in the terahertz spectral range is only very limited. Recent semi-classical calculations show that confinement of charges in nanostructures may create a very strong terahertz nonlinearity. The aim of this work is the observation, investigation and understanding of terahertz nonlinear response in selected semiconductor nanostructures. For this purpose, we will employ mainly our experimental setup for time-resolved terahertz spectroscopy; if needed, we will collaborate with user facilities such as ELI Attosecond in Szeged. During the work on the thesis, it will be necessary to adapt the setup to deliver more intense terahertz pulses, deeply understand the nonlinear terahertz response also of bulk semiconductors, and accommodate the current theoretical description including simulations of charge motion and description of the propagation of electromagnetic waves in inhomogeneous nonlinear environment.

Required knowledge: Basic knowledge of semiconductor physics and propagation of electromagnetic waves.

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