HL 27: Invited Talk: Martin Wagner

Time: Monday 17:00–17:30 Location: POT 51

Invited Talk HL 27.1 Mon 17:00 POT 51

Intraexciton terahertz nonlinear optics in quantum wells
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Terahertz (THz) light is not only used to probe low-energy material excitations in a spectral region that has become accessible only during the last decades, but at high field strengths it can also induce nonlinear optical effects and enrich our understanding of light-matter interaction. In our contribution we investigate experimentally nonlinear optical effects related to excitonic transitions in undoped GaAs/AlGaAs semiconductor quantum wells. Excitons as bound electron-hole pairs show an energy structure analogous to the hydrogen atom, however, the binding energy is scaled down by a factor of 1000 and lies in the THz spectral range. We make use of the intra-excitonic 1s to 2p transition to explore two basic concepts of nonlinear optics, i.e. the perturbative effect of sideband generation and the non-perturbative Autler-Townes effect. In sideband generation a near-infrared (NIR) laser beam is mixed with the THz beam to generate sidebands at the sum- and difference-frequencies around the NIR frequency. The Autler-Townes or AC Stark effect refers to a splitting of an energy level that is resonantly coupled via intense radiation to an adjacent level. Both effects with their large distinct signatures in the sample's optical response could find applications in future optical modulators.