Nonlinear Optics with Quantum Cascade Lasers – Terahertz-Optical sideband generation

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In this presentation we will show that nonlinear optical processes that have been previously limited to large scale facilities can be realized using a compact and practical device – the quantum cascade laser (QCL). In particular, I will show the generation of terahertz (THz) sidebands on an optical carrier through resonant interband and intersubband nonlinearities. This combination permits a giant nonlinearity and large conversion efficiencies without the considerations of phase matching. I will review our work performed using THz QCLs that show high order nonlinear effects as well as recent investigations on the nonlinear process up to room temperature with mid-infrared (MIR) QCLs.

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