245. Title: Bi-directional terahertz emission from gold-coated nanogratings by excitation via femtosecond laser pulses

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Abstract: We report on the investigation of terahertz (THz) emission from gold-coated nanogratings (500 nm grating constant) upon femtosecond laser irradiation (785 nm, 150 fs, 1 kHz, les1 mJ/pulse). Unlike common assumptions, THz emission is not only observed in case of rear side irradiation (through substrate (Welsh et al. in Phys. Rev. Lett 98:026803, 2007; Welsh and Wynne in Opt. Express 17:2470-2480, 2009)) of the nanograting, but also in case of front side excitation (through air). Furthermore in both cases, THz emission propagates in the direction of laser beam propagation and reverse. Based on these findings, we suggest a new approach to describe the newly observed phenomena. Using a highly sensitive and fast superconducting transition edge sensor (TES) as calorimeter, it was possible to directly measure the absolute energy of the emitted THz pulses in a defined spectral and spatial range,