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Simulations of terahertz pulse emission from thin-film semiconductor structures ANDREY SEMICHAEVSKY, Lincoln University (PA) — The photo-Dember effect is the formation of transient electric dipoles due to the interaction of semiconductors with ultrashort optical pulses. Typically the optically-induced dipole moments vary on the ns- or ps- scales, leading to the emission of electromagnetic pulses with terahertz (THz) bandwidths. One of the applications of the photo-Dember effect is a photoconductive dipole antenna (PDA). This work presents a computational model of a PDA based on Maxwell's equations coupled to the Boltzmann transport equation. The latter is solved semiclassically for the doped GaAs using a continuum approach. The emphasis is on the accurate prediction of the emitted THz pulse shape and bandwidth, particularly when materials are doped with a rare-earth metal such as erbium or terbium that serve as carrier recombination centers. Field-dependent carrier mobility is determined from particle-based simulations. Some of the previous experimental results [1] are used as a basis for comparison with our model. [1] J. O'Hara, J.M.O. Zide, A.C. Gossard, A.J Taylor, R.D. Averitt, "Enhanced Terahertz Detection via ErAs:GaAs nanoisland superlattices", Applied Physics, 88, 251119, 2006.

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