Abstract Submitted
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Substrate effects and photon energy dependence of ultrafast carrier relaxation in graphene[1] ADAM ROBERTS, DANIEL CORMODE, University of Arizona, JOHN FOREMAN, US Army Aviation and Missile RD&E Center, HENRY EVERITT, Duke University, US Army Aviation and Missile RD&E Center, BRIAN LEROY, ARVINDER SANDHU, University of Arizona — Ultrafast photo-excitation in graphene creates non-equilibrium carrier distributions and provides an avenue for the measurement of couplings between electronic and lattice degrees of freedom. Previous studies have explored the carrier relaxation dynamics in graphene on various substrates albeit primarily in the linear dispersion regime. We investigate the ultrafast carrier dynamics of graphene both in the linear band regime and near the saddle point. We perform femtosecond-resolved degenerate pump-probe differential transmission experiments to extract the timescales for electronic relaxation from different starting points on the band structure. The use of degenerate pump-probe allows us to obtain exact relaxation timescales corresponding to the local band structure without contributions from other carriers. We use multiple transparent substrates, such as fused silica, quartz, sapphire etc. to probe the substrate-graphene interactions at various points along the local electronic band structure. We find that in the UV regime, the relaxation dynamics in graphene shows remarkable dependence on the substrate, with relaxation timescales ranging from a few to hundreds of picoseconds We will also compare our measurements with those obtained in freestanding graphene samples.

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