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Experimental Measurement of Ultrafast Carrier Dynamics in Mono- and Multi-layer Graphene Samples DAOHUA SONG, KIN FAI MAK, YANG WU, CHUN HUNG LUI, Columbia University, MATTHEW SFEIR, Brookhaven National Laboratory, SAMI ROSENBLATT, HUGEN YAN, JANINA MAULTZSCH, TONY HEINZ, Columbia University — The ultrafast dynamics of charge carriers in mono- and multi-layer graphene was investigated by femtosecond transient reflectivity measurements. The experiments were performed using 100-fs optical pump pulses at a wavelength of 400 nm and probe pulses at a wavelength of 800 nm. We observed a transient response on the time scale of several picoseconds. For bulk graphite, a decay time of ~ 3 ps was found; for thin graphene multilayer samples, a reduced decay time was observed, dropping ultimately to ~ 1 ps for a single graphene layer. The reflectivity transients can be understood in terms of coupling of the photo-generated electronic excitations to optical phonons, and the subsequent loss of energy from this sub-system. The possible role of graphene interactions with the quartz substrate and the effect of the graphene electronic specific heat on the decay rate will be discussed.

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