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Doping dependence of the ultrafast relaxation dynamics of hot electrons in graphene LIANG ZHAO, JIE SHAN, Case Western Reserve University, KIN FAI MAK, TONY HEINZ, Columbia University — The ultrafast relaxation dynamics of highly excited electrons in graphene has attracted much attention due to both its fundamental interest and its practical importance in relation for optoelectronic devices. Several mechanisms including electron-optical phonon scattering and disorder assisted electron-phonon scattering have been proposed to be responsible for electron cooling on the picosecond time scale. In this work, we apply the technique of two-color femtosecond pump-probe spectroscopy to investigate the electron relaxation dynamics as a function of doping. The photo-induced absorption in graphene is seen to vary rapidly in the first a few 100's fs, followed by a slower decay of $\sim$ ps. The dynamics depend sensitively on the doping level. We will present our analysis of the results in terms of the transient electron chemical potential and temperature and discuss the role of different doping mechanisms, in particular, in the regime where the Fermi energy approaches half of the probe photon energy.

Liang Zhao
Case Western Reserve University

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