Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Control of ultrafast electron dynamics in graphene by the shape of the optical pulse SEYYEDEH AZAR OLIAEI MOTLAGH, VADYM APALKOV, MARK STOCKMAN, Georgia State University — article We study theoretically the interband and intraband electron dynamics in graphene, a layer of one atom thick carbon, in the presence of an ultrafast optical pulse. The electron system is described within the effective low energy Dirac Hamiltonian for graphene near K and K' points in the first Brillouin zone. After the pulse, a nonzero residual conduction band population shows high irreversibility of electron dynamics. Our calculations show that the distribution of residual conduction band populations in the reciprocal space strongly depends on the profile of the pulse and the number of oscillations of the field in the pulse. We also calculated the transferred charge for optical pulses of different shapes. Our computations demonstrate that the dependence of the transferred charge on the pulse's amplitude is strongly affected by the pulse waveform, i.e., by the number of oscillations within the pulse. For one oscillation of the optical field, the transferred charge has a monotonic dependence on the amplitude of the pulse, while for many oscillations of the field, the transferred charge shows oscillatory behavior as a function of the pulse's amplitude.

Seyyedeh Azar Oliaei Motlagh
Georgia State University

Date submitted: 10 Nov 2016 Electronic form version 1.4