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Observation of coherent excitation of the interlayer shearing mode in graphite and multilayer graphene DAVIDE BOSCHETTO, CHUNG HUNG, LEANDRO MALARD MOREIRA, KIN FAI MAK, HUGEN YAN, TONY F. HEINZ, Department of Physics and Electrical Engineering, Columbia University, New York, New York, 10027 USA — Raman spectroscopy is one of the key methods for the characterization of single and multilayer graphene. In the bulk limit, the lateral motion of adjacent graphene planes gives rise to a Raman active low-frequency mode, the so-called interlayer shearing mode. Coherent excitation of this mode has been observed by femtosecond time-resolved reflectivity [1]. For the case of few-layer graphene, related modes are predicted to be present and to exhibit different properties as a function of layer thickness [2]. Here we report the observation of coherent oscillation of such shearing mode phonons in multilayer graphene. The experiments are performed on mechanically exfoliated graphene samples using femtosecond laser excitation pulses and time-delayed femtosecond probe pulses in a transient reflectivity measurement. The coherent shearing-mode phonons exhibit a period of 800 fs, with a lifetime exceeding 10 ps. We will discuss the characteristics of shearing mode phonons as a function of the thickness of multilayer graphene. [1] T. Mishina et al., Phys. Rev. B 62, 2908 (2000) [2] S. K. Saha et al., Phys Rev. B 78, 165421 (2008)

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