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Probing strain-induced changes in the electronic structure of graphene by Raman spectroscopy MINGYUAN HUANG, Department of Mechanical Engineering, Columbia University, HUGEN YAN, TONY HEINZ, Department of Physics, Columbia University, JAMES HONE, Department of Mechanical Engineering, Columbia University, COLUMBIA UNIVERSITY TEAM — Two-phonon Raman scattering in graphitic materials provides a distinctive approach to probing the material's electronic structure through the spectroscopy of phonons. This sensitivity arises from the role of resonant electronic transitions in two-phonon Raman scattering process. The 2D mode, for instance, is known to display a strong variation with thickness in few-layer graphene. This behavior is a consequence the change of the electronic structure of the material with thickness. Here we report studies of Raman scattering of the 2D mode of single-layer graphene under uniaxial stress and the implications of these measurements for the electronic structure of anisotropically strained graphene. Under anisotropic strain, two types of modification of the low-energy electronic structure of graphene are present: a deformation of the Dirac cone and its displacement away from the K point. By analyzing the 2D Raman spectrum for excitation at different photon energies, we have identified both effects. The direct influence of strain on the 2D phonons will also be discussed.

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