Abstract Submitted
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Bilayer graphene moire pattern amplitude vs. twist angle identified using scanning tunneling microscopy[1] JOSHUA THOMPSON, PIJUSH GHOSH, PAUL THIBADO, University of Arkansas, MEHDI NEEK-AMAL, FRANCOIS PEETERS, Universiteit Antwerpen, V.D. WHEELER, R.L. MYERS-WARD, C.R. EDDY, JR., D.K. GASKILL, U.S. Naval Research Laboratory — Twisted stacked layers of graphene have unique electronic properties. The layers produce a moire pattern with a wavelength determined by the twist angle. In addition, however, the surface of the moire pattern also has an increased corrugation amplitude when compared to untwisted AB-stacked graphene. The deformation strains the top-layer graphene lattice and realizes, in a natural way, triaxial stress creation as proposed by Guinea et al. Consequently, very large pseudo-magnetic fields can be created depending on the amplitude of the corrugations. Until now, no relation has been found between the moire twist angle and its corrugation amplitude. We found, using scanning tunneling microscopy, as the wavelength of the moire pattern increases so does its amplitude. Our experiments are supported by first-principles directed elasticity theory. The membrane corrugation amplitude at arbitrary twist angle is found to be a consequence of a competition between the van der Waals bonding energy and the energy required to bend the graphene.

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