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The Electronic Structure of Few-Layer Graphene: Probing the Evolution from a 2-Dimensional Sheet to a 3-Dimensional Solid by Optical Spectroscopy KIN FAI MAK, MATTHEW SFEIR, JAMES MISEWICH, TONY HEINZ, COLUMBIA UNIVERSITY, NEW YORK, NY 10027 COLLABORATION, BROOKHAVEN NATIONAL LABORATORY, UPTON, NY 11973 COLLABORATION — The evolution of the electronic structure of few-layer graphene, for n = 1, 2, 3, ..., 8 atomic layers, was characterized by optical absorption spectroscopy. Each thickness of few-layer graphene exhibited well defined and distinct infrared absorption peaks associated with interband transitions. The positions of the peaks were found to obey a simple scaling relation with layer thickness. The principal features of the experimental spectra for all samples could be described consistently in terms of the electronic states of the parent graphite material through application of a specific zone-folding construct obtained when only nearest-layer interactions are considered. Both the experiment and analysis permit one to follow the convergence of the multilayer graphene response to that of graphite with increasing sample thickness.

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