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Competing length scales for the electronic structure of rings of C60 JERRY TAN, University of Maryland, GARNETT BRYANT, National Institute of Standards and Technology — Recently, rings of C60 have been fabricated. This opens up the possibility of studying the electronic structure of complex nanosystems with competing length scales: here the length scale defined by individual C60 molecules, the length scale defined by moving along the inner edge of the ring of C60s, and the length scale for the outer edge. The effects of such competing length scales could be probed with a magnetic field B. We use a tight-binding model to study these effects theoretically. Noninteracting electrons are considered. B is included with a Peierls transformation. Calculated electronic spectrum for an isolated ring of carbons, here used as a simple model for C60, is compared with spectra for rings of carbon rings. Changes in spectra due to inter-ring hopping are identified. New structure in the density of states is correlated with the spatial distribution of states in rings of rings. A magnetic field is applied to access and couple different length scales. Calculated spectra for rings of full C60 molecules are compared with the model results to highlight the effects of competing length scales in C60 rings. Results are used to suggest possible experiments for rings of C60 molecules.

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