

Abstract Submitted
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Width-dependent dimensional crossover in zigzag graphene nanoribbons MAHDI ZAREA, NANCY SANDLER, Ohio University — The exact solution of a tight-binding Hamiltonian shows that the unusual width-dependent band-structure of zigzag graphene nanoribbons (ZGNR) is caused by spinor wavefunction phase shifts. These results suggest the correct continuum description of these systems to be in terms of effective coupled-chains models. The particular anisotropic continuum limit reproduces the physics of ZGNR with high accuracy while capturing the width-dependence effect. It also reveals the underlying connection between tight-binding ZGNR models and a continuous set of two-dimensional models that include the square lattice and the π -flux model. The Majorana fermion language used in this approach shows that ZGNRs are physical realizations of various quantum spin chain (QSC) models.

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