Abstract Submitted
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Power-Law Correlated Disorder in Graphene and Square Nanoribbons[1] NANCY SANDLER, GREG PETERSEN, Ohio University — Two dimensional metal-insulator transitions have remained an active topic in condensed matter physics do to the lack of a general model that can predict when an MIT occurs. With the creation of truly 2D crystals and nanostructures, the question has become increasingly relevant. Though initially predicted to not contain a MIT transition, the inclusion of electron-electron interactions and/or spatial disorder can drive a MIT in some 2D systems. In the case of graphene, correlated ripples are present even when the nanoribbons are freestanding and can have an effect on the transport properties while electron-electron interactions are normally considered negligible. To explore the effect of ripples, we model graphene with a long-range power-law spatial correlation of the form $\langle \epsilon_i^2 \rangle = 1/(1+|\vec{r_i}/a|)^\alpha$ where ϵ_i, $\vec{r}$, a, and α are the on-site energy, position, lattice constant, and strength of the correlation respectively. It should be noted that much work has been completed on short-range correlations but little on truly long-range correlations. We also present our finding for the square lattice for comparison.

[1] Abrahams E. Phys. Rev. Lett. 42, 673-676 (1979)
[2] Abrahams E. Ann. Phys. 8 (1999) 7-9, 539-548

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