Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

The Effects of the Mean-Field Interaction on the Anderson Localization of Graphene Nanoribbons JACK BALDWIN, Y. HANCOCK, Department of Physics, University of York, UK — A generalized tight-binding (TB) model,[1] which includes a mean-field Hubbard-U and up to 3rd nearest-neighbor hopping terms, is applied to edge-disordered zigzag graphene nanoribbons in order to study spin-transport within the Landauer-Bütticker formalism. Edge-disorder is modeled by random perturbation of the on-site energy in the range $-E..E$ on all edge atoms, and the resulting Anderson localization lengths determined. We compared the Anderson localization lengths and spin-transport features obtained from the generalized model, an extended TB model (non-interacting) and the simplified TB model (1st nearest neighbor hopping only). Within the range $\pm E$ =0.5 eV the Anderson localization length for a single spin was found to decrease by 86.4% with the introduction of the Hubbard-U in the generalized model compared to the non-interacting models, whereas the opposite spin remained unchanged across all model types. For the range $\pm E$ =2.0 eV the Anderson localization length for both spin types decreased by 71.4% and 76.2% in the generalized model when compared to the extended TB model, and 76.5% and 80.4% when compared to the simplified TB model.

[1]Hancock *et al.* PRB **8**1, 245402 (2010).

Jack Baldwin
Department of Physics, University of York, UK

Date submitted: 15 Nov 2012 Electronic form version 1.4