Abstract Submitted
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Electric-field control of magnetism in graphene quantum dots: A route to spin field effect transistors[1] LUIS AGAPITO, NICHOLAS KIOUSSIS, Department of Physics, California State University Northridge, EFTHIMIOS KAXIRAS, Department of Physics, Harvard University — Graphene is a promising candidate for all-carbon electronics because of its outstanding electrical, mechanical, and thermal properties. Also, the relentless drive for miniaturization leads to the use of ever smaller graphene fragments; at nanoscopic dimensions ($<$ 10nm), edge states become more relevant. Edge states are important because they lie in the vicinity of the Fermi level and hence are relevant to transport properties. Furthermore, edge states exhibit magnetism. We have employed ab-initio electronic structure and Landauer-Büttiker transport calculations to study the magnetoelectro effects of graphene patches. We will present results of (1) how specific geometries (such as "diamond" shape) favor specific magnetic states, (2) how those magnetic states can be controlled by an external electric field [1], and (3) we will demonstrate how a graphene fragment containing different edge geometries can be employed as a spin-polarized field effect transistor.

[1] Agapito et al., PRB Rap. Com. 82, (2010)

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