Abstract Submitted
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Valley FETs in graphene[1] YU-SHU WU, FENG-WU CHEN, MU-KUEN LEE, MAIO-LING LIN, NING-YUAN LUE, YEN-CHUN CHEN, National Tsing-Hua University — Graphene electrons carry a unique binary degree of freedom called valley pseudospin, in association with the two-fold valley degeneracy at the Dirac points (K and K') of Brillouin zone. Such pseudospin responds to external electromagnetic fields in ways similar to those an ordinary electron spin does, and hence qualifies for an information carrier [1]. Implementation of the corresponding electronics – valleytronics can be carried out in a unified fashion, namely, by utilizing the valley-orbit interaction (VOI) existing between an in-plane electric field and a valley pseudospin. Based on the VOI mechanism, a family of valleytronic structures have been proposed, such as valley qubits, valley filters, and valley FETs [2]. This presentation discusses the valley FET as an example to demonstrate such a methodology. Specifically, it will describe the underlying principle as well as our recent numerical simulation of electron transport through this structure based on the algorithm of recursive Green's function method. [1] Rycerz et al., Nat. Phys. 3 (2007),172; Xiao et al., Phys. Rev. Lett. 99, (2007), 236809. [2] Wu et al., Phys. Rev. B 84, (2011), 195463; ibid B 86 (2012), 165411; ibid B 88 (2013), 125422; ibid B 94 (2016), 075407.

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