Abstract Submitted
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Theoretical Study of All-Electrical Quantum Wire Valley Filters in Bilayer Graphene[1] YU-SHU WU, National Tsing-Hua University,Taiwan, NING-YUAN LUE, YEN-CHUN CHEN, NTHU,Taiwan, JIA-HUEI JIANG, NTHU, Taiwan, MEI-YIN CHOU, AS,Taiwan — Graphene electrons carry valley pseudospin, due to the double valley degeneracy in graphene band structure.[1] In gapped graphene, the pseudospin is coupled to an in-plane electric field, through the mechanism of valley-orbit interaction (VOI),[2] Based on the VOI, a family of electrically-controlled valleytronic devices have been proposed. Here, we report the theoretical study of a recently proposed valley filter consisting of a Q1D channel in bilayer graphene defined and controlled by electrical gates. We discuss two types of calculations – those of energy subband structure in the channel and electron transmission through a valley valve consisting of two proposed filters. For the former, we have developed a tight binding formulation in the continuum limit. For the latter, we employ the recursive Green's function method. Results from the calculations will be presented. References [1] Rycerz et al., Nat. Phys. 3, 172 (2007); Xiao et al., Phys. Rev. Lett. 99, 236809 (2007). [2] Wu et al., Phys. Rev. B 84, 195463 (2011); ibid B 86, 045456 (2012); ibid B 86, 165411 (2012); ibid B 88, 125422 (2013).

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