The Rashba Type Splitting of Valley Pseudospins in Gapped Graphene Quantum Wires YEN-CHUN CHEN, Department of Physics, National Tsing-Hua University, Hsin-Chu, Taiwan 30013, ROC, NING-YUAN LUE, MIAO-LIN LIN, GEORGE, YU-SHU WU, Department of Electrical Engineering, National Tsing-Hua University, Hsin-Chu, Taiwan 30013, ROC — A semiconductor with a strong spin-orbit interaction (SOI) exhibits pronounced Rashba spin splitting when subject to an electric field. Although gapped graphene is a semiconductor with an extremely weak SOI, a spin-like electron degree of freedom called valley pseudospin, in association with the doubly degenerate energy band valleys at Dirac points (K and K'), exists in graphene [1] and interacts with the orbital degree of freedom via the so-called valley-orbit interaction (VOI) [2]. In the presence of an in-plane electric field, the VOI induces the pseudospin splitting similar to the Rashba spin splitting. Here, we report our recent numerical study of Rashba type splitting of valley pseudopsins in gapped (monolayer and bilayer) graphene quantum wires subject to in-plane transverse electric fields.

[1] K. S. Novoselov et al. Science **306**,666(2004); A. H. Casto Neto et al. Rev. Mod. Phys. **81**,109(2009); A. Rycerz et al. Nature Phys.**3**,172-175(2007);
[2] G. Y. Wu et al. PRB **84**,195463(2011); M. K. Lee PRB **86**,165411(2011); G. Y. Wu et al. PRB **88**,125422(2013)

Yen-Chun Chen
Department of Physics, National Tsing-Hua University,
Hsin-Chu, Taiwan 30013, ROC

Electronic form version 1.4