Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Theory of hydrogen induced giant spin-orbit coupling in graphene[1] MARTIN GMITRA, DENIS KOCHAN, JAROSLAV FABIAN, University of Regensburg — Adatoms seem for now the most perspective way of increasing and controlling spin-orbit coupling in graphene. Hydrogen in articular is a role representative, as it gives both lattice deformation and covalent bonding, both contributing towards sigma-pi hybridization needed for the increase of the spin-orbit coupling around K. To establish the relevant physics of the H induced spin-orbit coupling in graphene, we have performed systematic calculations of hydrogenated graphene. We found that the magnitude of the coupling is of the order of meVs, exactly what is needed to explain the experimental data on spin relaxation. Doing both first-principal calculations and tight-binding modeling we calculate the spin-orbit splittings and introduce an effective hopping model that can be used in realistic investigations.

[1]The work is supported by the DFG SFB 689.

Martin Gmitra
University of Regensburg

Date submitted: 10 Nov 2011 Electronic form version 1.4