Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Electronic structure of bilayer graphene on transition metal dichalcogenides[1] MARTIN GMITRA, DENIS KOCHAN, JAROSLAV FABIAN, Uni Regensburg, SPINTRONICS GROUP TEAM — Graphene on transition-metal dichalcogenides (TMDCs) opens new venues for optospintronics [1], as well as for investigating giant proximity spin-orbit effects [2]. We have predicted that graphene on WSe2 exhibits robust helical edge states within a 7 K Rashba gap [2]. However, for an experimental observation, ultraclean graphene would be required to see such effects, due to electron-hole puddles which in monolayer graphene mask spectral features at such levels. The cure is bilayer graphene, in which the energy fluctuations are much weaker and meV features could be well resolved. Here we present our first-principles results for the electronic band structures of bilayer graphene on TMDCs, and discuss the orbital and spin-orbital proximity effects with phenomenological symmetry-based Hamiltonians that we use to fit the first-principles data. A fascinating perspective is to have a gating tenability of the proximity effects, which we will also discuss by presenting calculations in the presence of transverse electric fields. [1] M. Gmitra, J. Fabian, Phys. Rev. B 92, 155403 (2015). [2] M. Gmitra, D. Kochan, P. Högl, J. Fabian, Phys. Rev. B 93, 155104 (2016).

[1]The work is supported by the DFG SFB 689 and the EU Seventh Framework Programme under Grant Agreement No. 604391 Graphene Flagship.

Martin Gmitra
Uni Regensburg

Date submitted: 11 Nov 2016 Electronic form version 1.4