Abstract Submitted
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Proximity Induced Exchange Splitting in Graphene[1] SHANSHAN SU, Department of Electrical and Computer Engineering, University of California, Riverside, YAFIS BARLAS, Department of Physics and Astronomy, University of California, Riverside, ROGER LAKE, Department of Electrical and Computer Engineering, University of California, Riverside — We perform an ab-initio study of the proximity effect in a two-dimensional (2D) heterostructure composed of graphene and a thin film ferromagnetic insulator (europium oxide, EuO). Two different structures are considered i) graphene on a EuO layer and ii) graphene sandwiched between two EuO layers. Both structures show two-fold degenerate low-energy bands at the Γ point in the Brillouin zone, however, the former heterostructure shows a clear energy gap in the spectrum whereas the latter exhibits degenerate band crossings. The two different spectra result from a competition of proximity induced exchange splitting on the graphene sheet and sub-lattice mass induced due to the crystal field effect. Addition of spin-orbit coupling in the sandwiched structure indicates lifting of this two-fold degeneracy leading to band anti-crossings if the inversion symmetry perpendicular to the graphene plane is broken.

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