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Magnetic Insulators-Induced Proximity Effects in Graphene ALI HALLAL, HONGXIN YANG, DAMIEN TERRADE, SPINTEC, CEA/CNRS/UJF-Grenoble 1/Grenoble-INP, INAC, Fr-38054, Grenoble, France, XAVIER WAINTAL, SPSMS-INAC-CEA, 17 rue des Martyrs, Fr-38054, Grenoble France, STEPHAN ROCHE[1], Institucio Catalana de Recerca i Estudis Avanats (ICREA), 08010 Barcelona, Spain, MAIRBEK CHSHIEV, SPINTEC, CEA/CNRS/UJF-Grenoble 1/Grenoble-INP, INAC, Fr-38054, Grenoble, France — Due to its very long spin diffusion lengths up to room temperature, emergence of magnetism in graphene has attracted a lot of research interest in the field of spintronics. Several methods have been proposed to magnetize graphene, from edge magnetism, to depositing magnetic atoms or molecules, and using ferromagnetic substrate. We present first-principles calculations of spin-dependent properties in graphene induced by its interaction with ferromagnetic insulator EuO, and show that this proximity effect results in spin polarization of graphene π orbitals by up to 24% together with large exchange splitting bandgap of about 36 meV. Moreover, the position of the Dirac cone is shown to depend strongly on the graphene-EuO interlayer distance. These findings pave the way towards the possible engineering of graphene spin gating by proximity effect especially in a view of recent experiments on successful growth of Europium oxide on top of graphene.

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