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Graphene on magnetic substrates

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One of the limitations in exploiting the spin injection and transport properties of graphene is its strong electronic interaction with magnetic contacts. The π-states form complex and non-linear hybrid states when graphene is interfaced with 3d magnetic materials, such as Fe, Co, and Ni. Using density functional theory calculations and angle- and spin-resolved photoemission spectroscopy, I show that the graphene/Eu/Ni(111) system presents a largely doped and nearly freestanding dispersion of the ππ* states, along with a lifting of spin degeneracy (Phys. Rev. Lett. 2024, 132, 266401). The interaction with the Eu states leads to the opening of a large gap in the Dirac cones, which significantly differs for the two spin channels, and to the presence of a spin-polarized van Hove singularity at the Fermi level. The results obtained for this specific system will be discussed in the context of the current literature and used to outline potential developments.

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