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RKKY interaction in MoS_2[1] DIEGO MASTROGIUSEPPE, NANCY SANDLER, SERGIO ULLOA, Ohio University — MoS_2 belongs to a family of layered compounds –the transition metal dichalcogenides– that are attracting increasing attention in the solid state community due to their very rich phase diagram. In particular, the semiconducting ones in their 2D form, are of particular interest in the search for a new generation of devices in nanoelectronics and nanophotonics. The hexagonal lattice allows one to describe the low-energy physics with a massive Dirac equation around the K and K' points. Moreover, the presence of a large intrinsic spin-orbit interaction due to the presence of transition metal atoms, leads to a valley-dependent splitting of the states of an otherwise spin-degenerate valence spectrum. We study the Ruderman-Kittel-Kasuya-Yosida (RKKY) interaction between two magnetic impurities in the direct band gap semiconducting single-layer MoS_2, focusing in the p-doped case. Going beyond a recent study [1], we include the effects of the spin-degenerate valence bands at the center of the Brillouin zone, relevant for energies close to the valence band maximum. The easy experimental tunability of the carrier concentration by electrical or chemical means, makes possible the study of the carrier-mediated spin-spin interaction at different fillings.

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