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An FRG approach to the Heisenberg-Kitaev model JOHANNES REUTHER, Karlsruhe Institute of Technology, RONNY THOMALE, Stanford University, SIMON TREBST, University of California, Santa Barbara — We apply the Functional Renormalization Group (FRG) method to frustrated spin-1/2 systems on two dimensional lattices such as the Heisenberg-Kitaev model. In order to be able to perform diagrammatic approximations, we use the pseudo fermion representation of spin operators. The FRG provides a systematic scheme for infinite order resummations in different interaction channels and hence allows to treat magnetic order and disorder effects on an equal footing. Calculating the magnetic susceptibility we identify different magnetically ordered and paramagnetic phases. In particular, the Heisenberg-Kitaev model exhibits magnetically ordered states well beyond the isotropic Heisenberg limit as well as an extended gapless spin-liquid phase around the highly anisotropic Kitaev limit. From the RG flow of the magnetic susceptibility we extract both, the Curie-Weiss scale and the critical ordering scale (for the magnetically ordered states). The Curie-Weiss scale changes sign, indicating a transition of the dominant exchange from antiferromagnetic to ferromagnetic, deep in the magnetically ordered regime. We discuss our results in light of recent experimental susceptibility measurements for Na_2IrO_3 and Li_2IrO_3.

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