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Spin excitations in the 2D dipolar honeycomb magnet ErBr3

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The discovery of Dirac-cones in graphene and related compounds has promoted the search for magnetic Dirac materials. Candidates are the metal tri-halides $CrBr_3$ and CrI_3 which possess topological magnonic band structures [1,2].
Here we report the study of the magnetic ground-state and excitations in isostructural $ErBr_3$.
In this compound magnetic order with propagation vector $\vec{k}$=(1/3,1/3,0) was reported by neutron diffraction in the temperature range between 50 and 290 mK [3] which has been shown to have two-dimensional (2D) character. Within a mean-field approximation, we show that the spin structure of Er^3+, shown in Fig. 1a, is explained by dipolar interactions consistent with results for a 2D honeycomb lattice [4].
We modeled the spectrum of spin wave excitations in ErBr3 within a random-phase approximation that includes the anisotropy of the crystal-field. The results are shown in Fig. 1b. Our results also show the existence of magnetic Dirac-cones at the K and K'-points in the Brillouin zone. We suggest that this is the consequence of the invariance of the magnetic vortex ground state under combined parity and time reversal symmetry [5].

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[1] S. S. Pershoguba et al., Phys. Rev. X 8, 011010 (2018).
[2] Lebing Chen et al., Phys. Rev. X 8, 041028 (2018).
[3] K. W. Kraemer et al., Phys. Rev. B 60, R3724 (1999).
[4] V.M. Rozenbaum, Phys. Rev. B 51, 1290-1293 (1995).
[5] K. Li et al., Phys. Rev. Let. 119, 247202 (2012).

Position

Phd

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