Thickness dependence of magnetic properties in FeOCl

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The interest for van der Waals materials has significantly increased since 2004 and the first successful isolation of graphene that opened the world of the 2D physics [1]. Their individual layers are weakly bonded, making them ideal for the development of 2D devices, or even to build heterostructures by stacking layers of different natures and properties. It is in this context that van der Waals 2D magnets have become one of the very active fields of research since the first demonstration of 2D ferromagnetic order in an atomically thin layer of CrI_3 in 2017 [2]. In recent years, intralayer antiferromagnetism has been largely explored in the MPX_3 family. The MOCl family is another representative of intralayer antiferromagnetism and its members are reported to be stable in ambiant conditions. FeOCl exhibits a particular magnetic ground state at low temperature, with magnetic moments ordering in spin spirals below $T_N = 82K$ [3,4,5]. This particular order is mainly due to a strong Dzyaloshinskii-Moriya interaction within the material [4] and some recent preliminary DFT simulations predicts that it should remain even in the monolayer [6]. Here, we use low temperature magneto-Raman scattering techniques to investigate the magnetic ordering in thin layers of FeOCl. We observe a pronounced dependence of the magnon excitation spectrum on the number of layers highlighting the role of the interlayer magnetic exchange interaction in this compound.

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