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Collective spin excitations in magnetically ordered graphene Quantum Hall insulator[1] JOSE LADO, JOAQUIN FERNANDEZ-ROSSIER, International Iberian Nanotechnology Laboratory — At half filling, the application of a perpendicular magnetic field in graphene results in a very large density of states at the Fermi energy, due to the n=0 Landau levels. Interactions are known to lead to some sort of electronic order that leads to a band-gap opening. Experimental evidence [1] suggest that electronic order is antiferromagnetic, and can be tuned into ferromagnetic upon application of a large in-plane field. This behaviour is properly captured by mean field Hubbard model [2]. In this talk, by using tight binding models and calculating responses within the random phase approximation [3], we show the different collective modes of bulk and edges associated to the different electronically ordered phases. Furthermore, we discuss the coupling of these spin waves to quasiparticles transport at the edges and discuss how this can affect chiral spin transport.

[1] A. F. Young et al, Nature 505, 528-532 (2014)
[2] J. L. Lado and J. Fernández-Rossier, Phys. Rev. B 90, 165429 (2014)
[3] J. L. Lado and J. Fernández-Rossier, in preparation

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Jose Lado
International Iberian Nanotechnology Laboratory

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