Magnons and phonons in 2D van der Vaals magnets

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Two-dimensional van der Waals magnons is a new field which only originated a few years ago and is rapidly developing. I will first briefly review the besic properties of these materials, concentrating on the magnon spectra. I will show that for mono- and bilayers magnons have Dirac-like spectra, similar to that of electrons in graphene, with gaps at the Dirac point induced by anisotropy. As magnons are bosons, the Dirac points in the spectra are difficult to probe. I will show that they can be probed by the valley Seebeck effect, which is determined by the Berry curvature of the spectrum [1]. Furthermore, I will discuss the Neel transition in suspended few-layer $FePS_3$ and will theoretically explain the shift of transition temperature with the gate voltage and the jump of the mechanical quality factor at the transition [2].

[1] Xuechao Zhai and Yaroslav M. Blanter, arXiv:2002.00446

[2] Makars ikins, Martin Lee, Samuel Maas-Valero, Eugenio Coronado, Yaroslav M. Blanter, Herre S. J. van der Zant, and Peter G. Steeneken, arXiv:1911.08537