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Magnon softening in a ferromagnetic monolayer ANDREA TARONI, ANDERS BERGMAN, LARS BERGQVIST, JOHAN HELLSVIK, BJÖRGVIN HJÖRVARSSON, OLLE ERIKSSON, Uppsala University — Recent progress in experimental techniques have allowed the first ever observation of the magnon dispersion spectrum of a single ferromagnetic monolayer of Fe on W(110) [1]. The measurements revealed magnon energies that are small in comparison to the bulk and surface Fe(110) excitations. More surprisingly, these energies are also much smaller than those predicted theoretically [2, 3]. This discrepancy, related to a strong magnon softening, raises the possibility that 1 ML Fe/W(110) may not be a simple itinerant ferromagnet, as generally assumed. Prompted by these developments, we have examined the Fe/W(110) system through a combination of first principles calculations and detailed atomistic spin dynamics simulations [4]. We focused on the dispersion of the spin waves parallel to the [001] direction. Our results compare favourably with the experimental data [1], and correctly reproduce the drastic softening of the magnon spectrum, with respect to the bulk. We thus resolve a discrepancy between theory and experiment, and demonstrate the predictive power of the atomistic spin dynamics approach. [1] Prokop et al PRL 102, 177206 (2009) [2] Muniz and Mills, PRB 66, 174417 (2002) [3] Costa et al, PRB 78, 054439 (2008) [4] Skubic et al, JPCM 20, 315203 (2008)

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