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Evolution of the helimagnon dispersion

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We present measurements of the magnetic field-dependency of the helimagnetic band structure in MnSi. For low fields the helimagnons were previously discovered and mapped out by Janoschek et al. (Phys. Rev. B, 81(21), 214436, 2010) and Kugler et al. (arXiv:1502.06977, 2015), respectively. The high-field ferromagnetic dispersion, on the other hand, has been well known since the 1970s when it was measured by Ishikawa et al. (Phys. Rev. B, 16(11), 4956, 1977). Preliminary measurements we performed on the triple-axis spectrometer MACS (at NIST) suggest that the helimagnetic bands can still be seen even in the ferromagnetic regime (we used fields up to 1 T). This would still be in agreement with Ishikawa as they used thermal neutrons and thus had such a large resolution volume as to not being able to discern individual bands. Our measurements are currently being continued at the instruments MIRA (at MLZ) and later at TASP (at PSI). So far at MIRA we could see the band structure collapse into a single-magnon dispersion for very high fields of a few tesla. For fields below one tesla we saw a shifting in energy of mainly the first band. Here, the spectrum appears as a single non-symmetric peak as the first band moves towards the position of the other bands.

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