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The Higgs amplitude mode in the ferromagnetic phase of $ZrZn_2$
LINDEN HAYES, KEVIN BEDELL, Boston College — Bedell and Blagoev derived the collective spin modes of a ferromagnet in the low temperature limit [1]. This derivation yielded both the Nambu-Goldstone mode, already known for ferromagnetic systems, as well as another massive, gapped mode. This mode was found to be associated with fluctuations in the order parameter by Zhang, Farinas, and Bedell and was identified as the Higgs amplitude mode, which had never been identified in a weak ferromagnetic system [2]. They applied their model to the weak ferromagnet MnSi using existing experimental results for the material, though an experiment run to detect the Higgs mode in MnSi has thus far been inconclusive. In this talk we fit the model to $ZrZn_2$, a weak itinerant ferromagnet that has a wealth of experimental data. These data are applied to the model in order to describe the dynamical structure function defined by Ferromagnetic Fermi Liquid Theory, which yields two distinct peaks from the Nambu-Goldstone mode and the Higgs amplitude mode. We then show that this result can be used in a neutron scattering experiment to detect the Higgs amplitude mode in $ZrZn_2$. [1] Bedell and Blagoev, Phil. Mag. Lett. (2001) [2] Zhang, Farinas and Bedell, arXiv: 1305.4674 (2014)

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