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Thermodynamics of Itinerant Magnets: A Simple Classical Model with Longitudinal Spin Fluctuations JAMES GLASBRENNER, ALEKSANDER WYSOCKI, KIRILL BELASHCHENKO, University of Nebraska - Lincoln — The effects of longitudinal spin fluctuations (LSF) on the thermodynamics of magnetic metals are studied using a model Hamiltonian with only one "itinerancy parameter." We performed Monte Carlo simulations and compared the results with the mean-field theory. A non-trivial complication is the choice of phase space measure. We explored two options: the "classical" measure and the "flat" measure. Our central result is that magnetic short-range order is always weak, and the mean-field theory is in a very good agreement with Monte Carlo results. Additionally, the results are very sensitive to the choice of the phase space measure, which is a limitation of our model. Nevertheless LSF are essential for the correct description of magnetic thermodynamics and their absence in the adiabatic approximation leads to unphysical results for itinerant systems. Deviations from the Curie-Weiss law due to LSF are also observed and discussed.

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