Übungen zur Theorie des Magnetismus   Sommersemester 16

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1. Finite-m predictions of the Stoner-theory   (5 Punkte)

   (a) Derive the $T = 0$ Stoner-criterion for finite m.

   (b) Consider the double-peak model DOS $\rho(\epsilon) = \frac{15}{26}\left(\frac{1}{4} + \frac{7}{16}\epsilon^2 - \frac{\epsilon^4}{8}\right)$. Increasing U from zero, which kind of Stoner instability do you find: is m increasing continuously from $m = 0$, or does it jump immediately to a finite value?

2. Competing instabilities   (5 Punkte)

For the half-filled square lattice tight binding band at $T = 0$, $\chi^{(0)}(\mathbf{Q})$ and $\chi^{(0)}(\mathbf{0})$ diverge simultaneously.

   (a) Decide which divergence is stronger by doing a calculation at finite temperatures, and taking the limit $T \to 0$. You may approximate the Fermi distribution by a piecewise linear function.

   (b) Compare the weak-coupling mean-field *Néel* temperatures for $d = 2$ and $d \neq 2$.