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Understanding Superfluid ^{3}He by Determining β-Coefficients of Ginzburg-Landau Theory H. CHOI, J.P. DAVIS, J. POLLANEN, W.P. HALPERIN, Northwestern University, Evanston, IL 6028, USA — The Ginzburg-Landau (GL) theory is a phenomenological theory that is used to characterize thermodynamic properties of a system near a phase transition. The free energy is expressed as an expansion of the order parameter and for superfluid ^{3}He there is one second order term and five fourth order terms. Since the GL theory is a phenomenological theory, one can determine the coefficients to these terms empirically; however, existing experiments are unable to determine all five fourth order coefficients, the β's. To date, only four different combinations of β's are known [1]. In the case of supeprfluid ^{3}He, using quasiclassical theory, the coefficients have been calculated [2]. We used the calculation as a guide to construct a model to define all five β's independently. The model provides us with the full understanding of the GL theory for ^{3}He, which is useful in understanding various superfluid phases of both bulk ^{3}He and disordered ^{3}He in aerogel.
[1] H. Choi *et al.*, J. Low Temp. Phys., submitted; http://arxiv.org/abs/cond-mat/0606786.
[2] J.A. Sauls and J.W. Serene, Phys. Rev. B **24**, 183 (1981).

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