

AN EVALUATION OF TEMPERATURE DEPENDENCE SPIN SUSCEPTIBILITY OF NORMAL ^3He LIQUID AT ALMOST LOCALIZED FERMION MODEL



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ABSTRACT

Using almost localised fermion model we have evaluated the value of spin susceptibilities (X/X_0) as a function of T for liquid ^3He for T below 2.5 K, for fixed values of $P(0) = 0, 15$ and 30 bar. Earlier we have studied the temperature dependence C_v , (C_v/RT) , (S/R) , $[P-P(0)]$ of liquid ^3He below 2.5 K using almost localized model. The physical basis of this model is the assumption that ^3He is a liquid close to localization or solidification. It is identical to nearly solid structure for the strongly spin - polarized state of ^3He . In the picture of almost localized fermions, the entropy is bounded by $R \ln 2$ only for temperature $T_F^x < T < U$. U is the effective short range interaction. Because in this temperature range only singly occupied lattice sites exist. The behaviour for $T > T_F^x$ is not simply that of free fermions. The singlet or density existations have a characteristic energy U and while the coherent Fermi liquid properties are lost on a scale of T_F^x free fermion behaviour is not recovered so long as $T < U$. There are thus two quite different characteristic temperature scales in ^3He . Our theoretically evaluated result are in good agreement with the experimental data.

Keywords: ^3He , Localized fermion model, Spin susceptibilities, Entropy etc.