

Journal of Low Temperature Physics 2008 vol.150 N3-4, pages 660-666

Understanding heavy Fermion from generalized statistics

Kaupp Y., Liraki S., Tayurskii D., Useinov A., El Kaabouchi A., Nivanen L., Minisini B., Tsobnang F., Le Méhauté A., Wang Q.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Heavy electrons in superconducting materials are widely studied with the Kondo lattice $t - J$ model. Numerical results have shown that the Fermi surface of these correlated particles undergoes a flattening effect according to the coupling degree J . This behaviour is not easy to understand from the theoretical point of view within standard Fermi - Dirac statistics and non-standard theories such as fractional exclusion statistics for anyons and Tsallis nonextensive statistics. The present work is an attempt to account for the heavy electron distribution within incomplete statistics (IS) which is developed for complex systems with interactions which make the statistics incomplete such that $\sum_{i=1}^w P_i q = 1$. The parameter q , when different from unity, characterizes the incompleteness of the statistics. It is shown that the correlated electrons can be described with the help of IS with q related to the coupling constant J in the context of Kondo model. © Springer Science+Business Media, LLC 2007.

<http://dx.doi.org/10.1007/s10909-007-9598-0>

Keywords

Heavy fermions, Kondo model, Nonextensive statistics