Collapse of Charge Ordering Due to Disorder in Quasi One-Dimensional Electron Systems

H. Yoshioka

Department of Physics, Nara Women's University, Nara 630-8506, Japan

Charge ordering (CO), which has been observed in molecular conductors with a quarter filled band, is a fascinating phenomenon that electrons are localized inhomogeneously but regularly. The origin of such charge localization is the long range component of the repulsive mutual interaction. On the other hand, disorder due to impurities is known to lead to electron localization. In this case, random charge distribution is realized. Therefore, localization by Coulomb interaction and by disorder compete against each other.

In the present study, effects of disorder on CO in quasi one-dimensional electron systems are investigated. We consider the system where one-dimensional chains expressed by the extended Hubbard model are coupled by the interchain interaction. This is the simplest model which can describe the finite temperature CO transition observed in actual materials.[1,2] The forward scattering is taken into account as an impurity potential. The CO transition temperature $T_{\rm CO}$ and the resistivity for $T > T_{\rm CO}$ are discussed based on the bosonization method with T being the temperature. Suppression of both quantities are obtained due to the impurity potential.

[1]H. Yoshioka, M. Tsuchiizu, and H. Seo, J. Phys. Soc. Jpn. **75**, 063706 (2006).
[2]H. Yoshioka, M. Tsuchiizu, Y. Otsuka, and H. Seo, J. Phys. Soc. Jpn. **79**, 094714 (2010).