The Hubbard model with orbital degeneracy and in polarizable media
van den Brink, Jeroen Gregorius Johannes

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Document Version
Publisher's PDF, also known as Version of record

Publication date:
1997

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):

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Introduction

In the theoretical description of the electronic structure of solids, the basis is given by the Bloch functions. The propagation of one single electron in a periodic solid due to the internal forces in the solid (average Coulomb field) due to the other electrons, has been very successful in explaining and predicting a wide range of properties of these solids. A more interesting aspect of effective one-electron theory is that the electronic structure can be treated as such, i.e. without using any free parameters. However, if we want to include the effect of interband transitions, the electronic structure must be treated in a more realistic way. In this context, we will focus on the application of effective one-electron theory to metals. A fundamental example is the case of layered structures and the transition metal oxides. Many of these oxides, for example, the perovskites, are predicted to be metals in single electron theory, but are in fact insulators with a large band-gap.

The basis of one-electron theory is caused by the assumption that the electronic structure is an average field of the other electrons. In order to understand this, it is necessary to consider what the consequences are of the averaging of the Coulomb field. The electrons have a kinetic energy and the interaction between the electrons can be defined by the average distance and deviations from the average. The potential energy of the electrons due to the Coulomb interaction is the interaction energy between the electrons. In the limit, we assume that the interactions between the electrons contribute to the total energy and that the electronic structure of the electron associates with their propagation is of secondary