9.7 cm

QUANTUM THEORY OF MAGNETISM AND A CONCEPT OF QUANTUM PROTECTORATE

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Some physical implications involved in a new concept, termed the "quantum protectorate" (QP), are developed and discussed. This is done by considering the idea of quantum protectorate in the context of quantum theory of magnetism. It is suggested that the difficulties in the formulation of quantum theory of magnetism at the microscopic level, that are related to the choice of relevant models, can be understood better in the light of the QP concept . We argue that the difficulties in the formulation of adequate microscopic models of electron and magnetic properties of materials are intimately related to dual, itinerant and localized behaviour of electrons. We formulate a criterion[1] of what basic picture describes best this dual behaviour. The main suggestion is that quasi-particle excitation spectra might provide distinctive signatures and good criteria for the appropriate choice of the relevant model. By this consideration an attempt is made to link phenomenological and quantum theory of magnetism together more firmly, thus giving a better understanding of the latter.[1] A.L.Kuzemsky, Int.J.Mod.Phys.B16, N 5 (2002)

13.4 cm

Subject category :

3. Transition Metals, Alloys and Compounds

Presentation mode :
poster

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