Magnetic Ions in Crystals

By K W Stevens

Princeton University Press, United States, 2014. Paperback. Book Condition: New. 231 x 152 mm. Language: English . Brand New Book ***** Print on Demand *****.There have been many demonstrations, particularly for magnetic impurity ions in crystals, that spin-Hamiltonians are able to account for a wide range of experimental results in terms of much smaller numbers of parameters. Yet they were originally derived from crystal field theory, which contains a logical flaw; electrons on the magnetic ions are distinguished from those on the ligands. Thus there is a challenge: to replace crystal field theory with one of equal or greater predictive power that is based on a surer footing. The theory developed in this book begins with a generic Hamiltonian, one that is common to most molecular and solid state problems and that does not violate the symmetry requirements imposed on electrons and nuclei. Using a version of degenerate perturbation theory due to Bloch and the introduction of Wannier functions, projection operators, and unitary transformations, Stevens shows that it is possible to replace crystal field theory as a basis for the spin-Hamiltonians of single magnetic ions and pairs and lattices of magnetic ions, even when the nuclei have vibrational motion. The...

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