

Abstract Submitted
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Strongly-correlated crystal-field approach to heavy-fermion compounds and to 3d oxides RYSZARD RADWANSKI¹, Institute of Physics, Pedagogical University, 30-084 Krakow, Poland & Center of Solid State Physics, Snt Filip 5, 31-150 Krakow, Poland, ZOFIA ROPKA, Center of Solid State Physics, Snt Filip 5, 31-150 Krakow, Poland — The description of electronic and magnetic properties of real compounds like LaMnO₃, LaCoO₃, Na₂V₃O₇, FeO, NdAl₂ and ErNi₅ as well as heavy-fermion superconductor UPd₂Al₃ and heavy-fermion metal YbRh₂Si₂, both zero-temperature ground state properties and thermodynamics, will be presented pointing out the existence of a discrete atomic-like low-energy, in the meV scale, electronic structure. This low-energy many-electron discrete atomic-like electronic structure is governed by very strong electron correlations, predominantly on-site, by the intra-atomic spin-orbit coupling and by details of the local surrounding (crystal-field interactions), but later is modified by inter-site interactions. Our studies indicate that there is the highest time to “unquench” the orbital moment in solid state physics in description of 3d-/4f-/5f-atom containing compounds and that heavy-fermion phenomena are of the relativistic origin.

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