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Title:

α -RuCl₃ - Spin orbit assisted Mott Insulator on the honeycomb lattice

Abstract:

We examine the role of spin-orbit coupling in the electronic structure of α -RuCl₃, in which Ru ions in 4d⁵ configuration form a honeycomb lattice. The measured optical spectra exhibit a clear optical gap and excitations within the t_{2g} orbitals. The spectra can be described very well with first-principles electronic structure calculations obtained by taking into account both spin orbit coupling and electron correlations. Furthermore, our X-ray absorption spectroscopy measurements at the Ru L-edges exhibit distinct spectral features associated with the presence of substantial spin-orbit coupling, as well as an anomalously large branching ratio. We propose that α -RuCl₃ is a spin-orbit assisted Mott insulator, and the bond-dependent Kitaev interaction may be relevant for this compound.