**Standard model of the Rare-Earths analyzed from the Hubbard I approximation**

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In this poster we examine critically the electronic structure of the rare-earth elements by use of the so-called Hubbard I approximation [1]. From the theoretical side all measured features of both occupied and unoccupied states are reproduced, without significant deviations between observations and theory. We also examine cohesive properties like the equilibrium volume and bulk modulus, where we find, in general, a good agreement between theory and measurements. In addition, we have reproduced the spin and orbital moments of these elements as they are reflected from measurements of the saturation moment. We have also employed the Hubbard I approximation to extract the interatomic exchange parameters of an effective spin Hamiltonian for the heavy rare earths. We show that the Hubbard I approximation gives results which are consistent with calculations where 4f electrons are treated as core states for Gd. The latter approach was also used to address the series of the heavy/late rare earths. Via Monte Carlo simulations we obtained ordering temperatures which reproduce measurements within about 20%. We have further illustrated the accuracy of these exchange parameters by comparing measured and calculated magnetic configurations for the heavy rare earths and the magnon dispersion for Gd.

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