

Introduction to Magnetic Oxides

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In this lecture, I will review the general magnetic properties of oxide materials. I will recall the basic rules for magnetic ordering and in particular the indirect exchange interactions through the oxygen. I shall underline the role of lattice distortions and charge and orbital ordering. I will illustrate the basic rules taking as two examples the manganites and the multiferroics. In the first family, I will present the correlation between magnetic properties and electrical transport introducing the colossal magnetoresistance effect. Transport properties will be illustrated through the models of magnetic localization. The problem of phase separation in these materials will be surveyed with a critical eye. Other metal/insulator transitions will be addressed especially in the antiferromagnetic nickelates. I shall then briefly illustrate the revival of the multiferroics through the example of BiFeO_3 . A particular emphasis will be given to its magnetic properties and their correlation to ferroelectricity. Finally, I will underline the relevance of magnetic oxides to the field of spintronics with a particular emphasis on antiferromagnets and multiferroics.