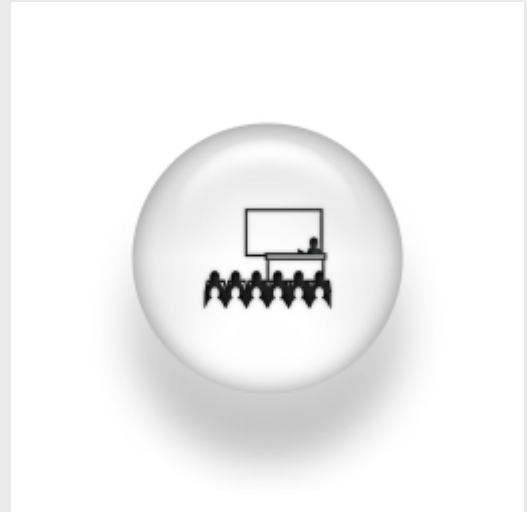


## Magnetic ground states in transition-metal oxides driven by superexchange interactions

Wednesday, 25th April 2012. 12:00-13:00



*Sergio di Matteo*

Université de Rennes 1, France

### ABSTRACT:

The aim of the present seminar is to provide a general introduction on the possible effects of superexchange interactions on magnetic ground states in transition-metal oxides. Three examples are introduced and discussed in some details: a) the case of spinel  $\text{MgTi}_2\text{O}_4$ ; b) the case of spinel  $\text{ZnV}_2\text{O}_4$ ; c) the case of Cr-doped  $\text{TiO}_2$ . The first two cases are a useful example to compare the differences in the magnetic ground states of two isostructural compounds characterized by a different filling. At the same time, case a) is also extremely pedagogical in clarifying the origin of magnetoelastic forces determined by exchange and superexchange interactions. Interestingly, in this case an exact solution of the superexchange Hamiltonian on the whole lattice can be found, leading to the formation of a so-called non-resonating valence-bond crystal. Case c), finally, is more complex to discuss, but it is introduced because nowadays the search for ferromagnetism in transition-metal doped compounds is very on fashion and the results obtained here are particularly interesting as a possible explanation for a global ferromagnetic coupling in the Cr-doped  $\text{TiO}_2$  cell.