

SFB 608

Einladung zum Kolloquium

- Ort:** Universität zu Köln
II. Physikalisches Institut
Seminarraum 201
- Zeit:** **Freitag**, 30. November 2007, **14:00**
- Sprecher:** S. Altieri
University of Modena
- Thema:** Enhancement of the magnetic ordering temperature of ultra-thin NiO films by screening

Transition metal oxides exhibit many spectacular magnetic and electrical properties including high temperature superconductivity and colossal magnetoresistance. If ways could be found to increase the relevant critical or ordering temperatures closer to or even above room temperature, one would immediately enlarge their potential for technological applications. This is even a more acute issue for the field of nano-materials science, since it is well known that finite size effects tend to strongly reduce those characteristic temperatures. Current approaches to overcome these problems include the use of chemical doping, pressure and strain. Here we propose to exploit the proximity effect by highly polarizable media as a new method to enhance the magnetic ordering temperature. The basic idea is to increase the relevant exchange and superexchange interactions by reducing the energies of the underlying virtual charge excitations, which can be done quite effectively by the screening from the polarizable media nearby. To prove this concept we have measured the Neel temperature (T_N) of a 3 monolayer NiO film epitaxially grown on a MgO(100) substrate and an equally thin film on a Ag(100). We find that the NiO/MgO system has $T_N < 40$ K, indeed very much reduced from the $T_N = 523$ K bulk value. For the NiO/Ag sample, however, we find $T_N = 390$ K, showing that the dramatic finite-size effects can be almost counterbalanced by the screening from the metal.

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