



Walther-Meißner-Institut

Bayerische Akademie der Wissenschaften



Walther-Meißner-Seminar

Walther-Meißner-Institut, Seminar Room 143

Date: Friday, 18 November 2016, 13:30 h

Speaker: Prof. Dr. Georg Schmidt

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Title: Spin dynamics and transport in complex oxides
and heterostructures

Abstract:

Complex oxides have a lot of interesting transport properties. Some of them can be observed in transport experiments on ordinary Hall bars, if necessary at low temperatures and in magnetic fields. Some properties, however, are only accessible in nanostructures or hybrid devices. For example the interface between LaAlO_3 (LAO) and SrTiO_3 (STO) has been subject to many investigations in the past decade. All experimental results were interpreted based on the assumption that the material shows homogeneous conductivity. Only in a few cases it was shown that areas of higher or lower conductivity exist and that these areas are correlated to the structural domains which appear in the STO substrate at low temperature. We have investigated transport in nanostructures whose lateral dimensions approach the typical domain size of the STO. In these structures we observe fully metallic behavior during cool down while during warm up the resistance becomes unmeasurably high when the temperature of the structural phase transition is approached. A second effect unique for complex oxides can be observed when $\text{La}_{0.3}\text{Sr}_{0.7}\text{MnO}_3$ (LSMO) is used as an electrode in organic spin valves. On one hand the LSMO can cause massive tunneling anisotropic magnetoresistance. On the other hand voltage pulses can be used to induce resistive switching. The switching is caused by the creation and motion of oxygen vacancies in the LSMO only and leads to a voltage controlled modulation of tunneling magnetoresistance. Because the effect takes place in the LSMO it can also modulate sign and magnitude of the TMR leading to signals which are strongly reminiscent of magnetoelectric coupling claimed in LSMO based multiferroic tunnel junctions.