TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

INSTITUT FÜR FESTKÖRPERPHYSIK
TECHNISCHE UNIVERSITÄT WIEN
WIEDNER HAUPTSTRASSE 8-10
1040 WIEN

E-MAIL: BAUER@IFP.TUWIEN.AC.AT
EISENMENGER@IFP.TUWIEN.AC.AT

Einladung zum Seminar

Simon Hurand

Laboratoire de Physique et d'Étude des Matériaux, CNRS - ESPCI ParisTech, 10 rue Vauquelin - 75005 Paris

" Control of superconductivity in micron-size channels at $LaAlO_3/SrTiO_3$ oxides hetero-interface"

Transition metal oxides display a great variety of quantum electronic behaviors where correlations often play an important role. The achievement of high quality epitaxial interfaces involving such materials gives a unique opportunity to engineer artificial materials where new electronic orders take place. It has been shown that a two-dimensional electron gas (2DEG) could form at the interface of two insulators such as $LaAlO_3$ and $SrTiO_3$ [1], or $LaTiO_3$ (a Mott insulator) and $SrTiO_3$ [2], which is also superconducting [3, 4] with Tc around 300mK. Its very low carrier density can be tuned by applying a Gate Voltage on the rear of the $SrTiO_3$ substrate, allowing field-effect modulated superconductor-metal quantum phase transition, and fine tuning of its rich properties such as the strong spin-orbit coupling or the filling of the different sub-bands. I will present low temperature transport measurements on micron-size superconducting channels patterned in $LaAlO_3/SrTiO_3$ hetero-structures, and more particularly, some results on the quantum phase superconductor-metal transition induced by magnetic or electric field, the stochastic behavior of the critical current, and the first achievement of Top-Gated control of the interface.

[1] Ohtomo, A., and H. Y. Hwang. "A high-mobility electron gas at the LaAlO3/SrTiO3 heterointerface." Nature **427, no. 6973** pp. 423-426 (2004).

[2] Ohtomo, A., D. A. Muller, J. L. Grazul, and H. Y. Hwang. "Artificial charge-modulation in atomic-scale perovskite titanate superlattices." Nature **419, no. 6905** pp. 378-380 (2002).

[3] Reyren, N., S. Thiel, A. D. Caviglia, L. F. Kourkoutis, G. Hammerl, C. Richter, C. W. Schneider et al. "Superconducting interfaces between insulating oxides." Science **317, no. 5842** pp. 1196-1199 (2007).

[4] Biscaras, J., N. Bergeal, A. Kushwaha, T. Wolf, A. Rastogi, R. C. Budhani, and J. Lesueur. "Two-dimensional superconductivity at a Mott insulator/band insulator interface LaTiO3/SrTiO3." Nature communications **1** pp. 89 (2010).

***Mittwoch, 10. 9. 2014, 16 Uhr s.t.,* Seminarraum 138b**

Host: S. Bühler-Paschen

Funding Organisation: ERC, "QuantumPuzzle"