

凝縮系物理学ゼミナール

Condensed Matter Seminar

Location: Room 413, School of Science Bldg. 5 (理学 5 号館 413 号室)

Date: 13:30-14:15, Wednesday, 12 October 2011

“Spin and charge ordering in strongly correlated heterostructures”

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Abstract:

In strongly correlated heterostructures, a non-uniform potential together with correlation effects can lead to novel electronic properties which are not realized in ordinary bulk systems. The pioneering experimental work was performed at the heterostructure created from insulating perovskite components, and the existence of high carrier mobility has been observed at LaTiO_3 (LTO)/ SrTiO_3 (STO) and LaAlO_3 / SrTiO_3 [1, 2]. In other experiments, superconductivity, magnetic correlation and, most interestingly, their coexistence state have also been observed in these systems. In this talk, we focus on the strongly correlated interface composed of band insulator (BI) and Mott insulator (MI), like STO/LTO [1], with particular emphasis on magnetic properties at the interface. We find intriguing magnetic/charge phase transitions at the interface, which are closely related with such competitive mechanism, and elucidate that these transitions are caused by the strong coupling between charge and spin degrees of freedom near the interface.

Furthermore, properties of the heterostructure under a magnetic field are also investigated, and we reveal that the external field induces a metamagnetic transition and a charge ordered state at the heterointerface.

References:

[1] A. Ohtomo, D. A. Muller, J. L. Grazul, and H. Y. Hwang, *Nature* **419**, 378 (2002).

[2] A. Ohtomo, and H. Y. Hwang, *Nature* 427, 423 (2004).