

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: 13:30–15:00, Wednesday, 15 October 2014

“Kondo screening in superlattices of strongly correlated electron systems”

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Abstract:

Starting with their experimental realization, multilayered structures of strongly-correlated-electron systems have developed into one of exciting directions in condensed matter physics [1-3]. Several experimental and theoretical efforts have clarified their rich, complex, and potentially useful behaviors, which are important and fundamental issues to uncover the nature of electron correlations.

New aspects of this field have been revealed via recent work on an oxide superlattice $(\text{LaVO}_3)_n/(\text{SrVO}_3)_m$, consisting of a Mott insulator and a metal. Electrical resistivity measurements have reported that (i) the temperature dependence of in-plane resistivity shows a peak structure [1], of which (ii) the peak position is a strong function of the superlattice periodicity [2]. (iii) A metal-insulator transition is also found with varying superlattice structures [3]. We elucidate these behaviors (i)-(iii) are due to the strong electron interaction, and well-described in a unified manner, Kondo-type screening [4]. In this talk, it will be shown that the Kondo effect is closely associated with the superlattice periodicity, and explains the experimental findings [1-3]. Additionally we will also discuss how the metallic layers are penetrating into the Mott-insulating layers by introducing the effective low-energy model.

References:

- [1] A. David, *et al.*, Appl. Phys. Lett. **98**, 212106 (2011).
- [2] U. Luders, *et al.*, J. Phys. Chem. Solids **75**, 1354 (2014).
- [3] W. C. Sheets, *et al.*, Appl. Phys. Lett. **91**, 192102 (2007).
- [4] S. Ueda and N. Kawakami, to be published.