

651st ASRC Seminar

Date : Monday, October 24, 15:00 ~

Location : Room 302, ASRC bldg.

Speaker : Professor Tomo Uemura
(Columbia University)

Title: Quantum phase transitions of Mott insulators and
itinerant-electron magnets:

RENiO_3 , V_2O_3 , $\text{Ba}(\text{Co,Ni})\text{S}_2$, MnSi , $(\text{Mn,Fe})\text{Si}$

Abstract: For studies of phase transitions, Muon Spin Relaxation (mSR) has a unique capability to separately determine the ordered moment size and the volume fraction of ordered regions, unlike neutron scattering, magnetization or transport studies which probes volume-integrated signals and thus blind to phase separation and other spatial heterogeneities. Taking advantage of this feature, we performed mSR measurements in Mott transition systems RENiO_3 and V_2O_3 , and demonstrated first order quantum transition associated with phase separation in the process of evolution from antiferromagnetic insulator phase to paramagnetic metal phase [1], in quantum tunings with substitution and pressure. Similar first order quantum evolution was found in the itinerant-electron helimagnet MnSi tuned with hydrostatic pressure [2]. In contrast, restoration of second order quantum criticality was observed in pressure tuning of $(\text{Mn,Fe})\text{Si}$. We will discuss roles of disorder in quantum evolution of these systems, and report present status of on-going studies on Mott transitions in $\text{Ba}(\text{Co,Ni})\text{S}_2$ and $(\text{La,Sr})\text{VO}_3$.

[1] B.A. Frandsen et al., *Nature Communications* 7 (2016) 12519.

[2] Y.J. Uemura et al., *Nature Physics* 3 (2007) 29-35.

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