



607th ASRC Seminar



Date: 16:00 – 17:00, Thursday, 19 November

Location: Meeting Room 103, ASRC bldg.

Speaker: Dr. Eiko Torikai (University of Yamanashi)

Title: Ultra Slow Muon Microscope - probing function of materials and lives across interface

Abstract: Reaction and transport across interface are essentially important to understand function of materials and lives. In order to study local functional properties and their dynamical aspects near surface and buried interfaces of a matter, we are developing a new imaging method by using ultra slow muon.

The Ultra Slow Muon Microscope (USMM), under construction in J-PARC/MLF, will be the first experimental instrumentation in the world possessing two novel muon sources with unique capabilities: an ultra slow muon beam for depth profiling from the surface to the interior of a material, across interfaces, with nanometer resolution near surface, and a muon micro-beam for probing the interior of a material with a resolution of several micrometers at the stopping position.

One of challenging applications of USMM is to detect spin of tunneling electrons in insulating layers by the muonium spin exchange method. Conduction electron polarization excited by circularly polarized photons in n-type GaAs was clearly detected, verifying the high sensitivity of the muonium spin exchange method on the basis of Pauli's exclusion principle. USMM combined with this method will provide powerful tool to reveal local as well as microscopic features of spin current with detailed information on spin life time, spin diffusion length and spin scattering cross section across interfaces regardless of method of spin injection. Another important subject is to study spin density of states at interface which affects efficiency of spin injection significantly.

Expected performance of USMM, progress of the development as well as the science explored by the new quantum beam will be discussed.



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