Seminar Schedule

Prof. Y. J. Uemura

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μ-SR studies on strongly correlated electron systems:

A. HTSC and other exotic superconductors:
I. Microscopic heterogeneity.
II. Pseudogap and condensation.
B. Spin fluctuations in correlated electron systems studied by μ-SR: helical itinerant magnet MnSi and S = 1/2 Kagome lattice Cu volborthite

Date： A-I. Feb. 4, (Tue.) 16：00～
A-II. Feb. 25, (Tue.) 16：00～
B. Mar. 27, (Thu.) 16：00～

Room: Seminar room, 2nd floor, prefab bldg

B. Spin fluctuations in correlated electron systems studied by μ-SR: helical itinerant magnet MnSi and S = 1/2 Kagome lattice Cu volborthite

ABSTRACT

Muon spin relaxation studies provide a unique and powerful probe for spin fluctuations. In this talk, we introduce our recent results in two different subjects:

(A) field dependence of spin fluctuations in MnSi near T_c

MnSi is a typical magnetic system based on itinerant electrons, which orders into a long spiral helical spin structure below T_c of about 30 K. In 1978-80, collaboration of Yamazaki-Ishikawa-Yasuoka groups performed μ-SR measurements of the spin relaxation rate $1/T_1$ in the external field of 700 G, and found a critical behavior $1/T_1T \propto 1/(T - T_c) \propto \chi$, which agrees with Moriya's Self Consistent Renormalizaiton Theory. Recently we have discovered that this critical behavior depends strongly on the applied external field H_{ext}. The field suppresses ferromagnetic component of spin fluctuations, while helical perpendicular component still exhibits critical slowing down. This slowing down is eliminated in the field higher than 2.3 kG. This phenomenon implies that even in the paramegnetic state, the system behaves as if it "knows" to order into a helical spin state.

(B) persisting dynamic spin fluctuations in s S=1/2 Kagome magnet

Recently, Z. Hiroi of ISSP succeeded in making a Cu volborthite $Cu_3V_2O_7(OH)_2\ 2(H_2O)$ which has S=1/2 Cu moments occupying a lattice very close to a perfect Kagome lattice. We performed μ-SR studies and found that even at $T = 100$ mK, Cu moments exhibit slow but persisting spin fluctuations, which have little dependence on temperature. This suggests existence of quantum spin fluctuations. We also present the results on the effect of (Cu,Zn) substitution, compare to the results to those of other Kagome systems with S=3/2 Cr moments, and discuss essential features of geometrical frustration on spin dynamics.

IFCAM: Y. Endoh (ext. 2070),
S. Maekawa (ext. 2005)