Geometrical Correlations of Itinerant Electrons Probed by Muons and Neutrons

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The geometrical frustration is a unique source of competing interactions and associated large degeneracy of ground states for localized electrons that might lead to exotic electronic states like "spin liquid". It has been one of the major topics in the field of magnetism, where various model-compounds for localized spins on triangular lattice and its derivatives (e.g., Kagome lattice) in two-dimension and those on the pyrochlore lattice (as a network of corner-shared tetrahedra) in three-dimension provided actual stages for studying the effect of geometrical frustration. While the current interest in the effect of frustration is still primarily on the local spin systems, we point out in this talk that there are a few but definite signs for exotic ground states lurking behind the similar stages when electrons become itinerant (metallic). Since the revelation of "heavy Fermion" behavior in LiV_2O_4 consisting of V pyrochlore sublattice, the origin of enhanced electron mass has been attributed to the Kondo mechanism common to the rare-earth metals. Recent μSR measurement has demonstrated, however, that the V local moments remain active even below the "Kondo temperature" where they would be presumed to disappear by the spin-singlet formation. We discuss the possible role of geometrical frustration in LiV_2O_4, and try to provide a perspective for further application of muons and polarized neutrons for the study of similar systems.