Neutron Scattering I

Applications

MS01.07.01 QUANTUM MAGNETIC EXCITATION IN HIGH-Tc SUPERCONDUCTORS AND THE RELATED MATERIALS. Masatoshi Arai, National Laboratory for High Energy Physics, 1-1 Oho, Tsukuba 305, Japan

Recent development of the pulsed neutron scattering technique has given very good opportunities to observe spin dynamics of low dimensional magnetic system. The magnetic dynamic structure factor in the wide range of the energy-momentum space can be observed in one time. Those were demonstrated on KFeS$_2$ [1], KCuF$_3$ [2], CsVCl$_3$ [3]. In this paper I will present on the quantum spin dynamics of the spin-Peierls system CuGeO$_3$ (T$_c$=14K) and the high-Tc superconductor La$_{1.85}$Sr$_{0.15}$CuO$_4$ (T$_c$=37K). For CuGeO$_3$, the double spin on continuum with J=10meV was clearly observed, which is surrounded by the lower boundary of the des Cloizeaux and Pearson type and the upper boundary with twice the energy and periodicity. Below T$_c$, a sharp excitation appeared at the zone boundary due to the halving of the Brillouin zone. The continuous magnetic excitation of La$_{1.85}$Sr$_{0.15}$CuO$_4$ has also been observed, which extends up to 280meV. Raising temperature does not affect the dynamic property at the high energy region but at the lower energy feature around the famous incommensurate peaks. In the paper I will discuss the similarity/difference to/between the quantum excitation of the localized spin singlet pairs in the spin-Peierls state and of the itinerant RVB singlet pairs in the superconducting state.