Inelastic neutron scattering study on spin excitations of Pr$_{0.88}$LaCe$_{0.12}$CuO$_{4-\delta}$ ($T_{c}$=27.5K) JUN ZHAO, SHILIANG LI, STEPHEN WILSON, University of Tennessee, HYE JUNG KANG, JEFF LYNN, NIST Center for Neutron Research, PENGCHENG DAI, University of Tennessee — We use neutron scattering to study the evolution of spin excitations in electron doped Pr$_{0.88}$LaCe$_{0.12}$CuO$_{4-\delta}$(PLCCO). For $T_{c}$ = 24 K PLCCO, Wilson et al. [Nature 442, 59 (2006)] have reported the presence of a resonance mode, a localized magnetic excitations coupled directly to the superconductivity in high-$T_{c}$ superconductors, similar to hole-doped superconductors such as YBa$_2$Cu$_3$O$_{6+\delta}$, Bi$_2$Sr$_2$CaCu$_2$O$_{8+\delta}$ and Tl$_2$Ba$_2$CuO$_{6+\delta}$. Below the resonance are continuing of magnetic scattering with little temperature dependence. We show here our studies of the magnetic excitations on PLCCO ($T_{c}$=27.5K) with the highest $T_{c}$ reported in the literature. We confirm the presence of a resonance mode in this sample, and demonstrate that the low-energy magnetic scattering here is much different from the $T_{c}$=24 K PLCCO. Our results thus shed new light to the understanding of spin excitations in electron-doped copper oxides.

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