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Crystal Field Excitations Across High Tc Phase Diagram in $La_{1.6-x}Nd_{0.4}Sr_xCuO_4$[1] QIANLI MA, DALINI MAHARAJ, CONNOR BUHARIWALLA, McMaster Univ, ALEXANDER KOLESNIKOV, MATTHEW STONE, Oak Ridge National Laboratory, BRUCE GAULIN, McMaster Univ — The family of high Tc superconductors(SC) $La_{1.6-x}Nd_{0.4}Sr_xCuO_4$ (Nd-LSCO) has been studied as it displays a complex picture of the canonical hole-doped high Tc phase diagram. It displays static charge and spin stripe order over a range of Sr doping, which are optimized around x=0.125. Nd-LSCO evolves from an AFM insulating phase at x=0, to a region (0.05<x<0.17) where static charge and spin stripe order co-exist with superconductivity at low temperatures, to an optimally-doped SC(x=0.19) with Tc=20K, and to what is believed to be a conventional non-superconducting Fermi liquid for $x > 0.25$. Here I present time-of-flight inelastic neutron scattering data of the Nd^{3+} crystalline electric field (CEF) levels on polycrystalline samples of Nd-LSCO over a range of compositions up to x=0.4. The experiments were performed on the SEQUOIA chopper spectrometer at the Spallation Neutron Source, and observe the evolution of the splitting of the J=9/2 multiplet appropriate to Nd^{3+} as a function of Sr concentrations (x=0.04,0.12,0.2,0.24 and 0.4) and (4K, 35K and 200K) temperature. We observe sharp CEF transitions near 21 meV and 27 meV at low x, evolve to a single transition near 24meV near x=0.1, in agreement with the onset of a superconducting ground state.

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