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Spin correlations and magnetic excitation spectrum of electron-doped $\mathbf{Nd_{2-x}Ce_xCuO_{4\pm\delta}}$ EUGENE MOTOYAMA, GUICHUAN YU, YUAN LI, INNA VISHIK, PATRICK MANG, MARTIN GREVEN, Stanford University, OWEN VAJK, University of Missouri - Columbia, KLAUDIA HRADIL, RICHARD MOLE, Forschungsneutronenquelle FRM-II — One of the most intriguing issues in the field of high-T_c superconductivity is the electron-hole asymmetry: the hole- or electron-doping of the parent Mott insulators leads to superconductors with differing properties. The phase diagram is asymmetric with respect to electron and hole doping, and for the comparatively less-studied electron-doped materials, the antiferromagnetic phase extends much further with doping, appearing to overlap with the superconducting phase. Our inelastic neutron scattering measurements have shown the possibility that in the archetypical compound $Nd_{2-x}Ce_xCuO_{4\pm\delta}$, genuine long-range antiferromagnetism and superconductivity do not co-exist (Motoyama *et al.*, Nature **445**, 186 (2007)). However, some uncertainty remains, due to the inhomogeneity of Ce concentration x in the large single crystals. Here we report new results using improved homogeneity. In addition to the implications for the phase diagram using energy-integrated measurements, we discuss the impact of improved crystals on the (energy-resolved) magnetic excitation spectrum in the superconducting state.

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