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High Energy Spin Dynamics in the electron-doped high-T_c cuprate $Pr_{.88}LaCe_{.12}CuO_4$ (T_c=21K)[1] STEPHEN WILSON, SHILIANG LI, University of Tennessee, PENGCHENG DAI, University of Tennessee/Oak Ridge National Laboratory, HYUNGJE WOO, University of Tennessee, CHRIS FROST, ISIS Rutherford Appleton Laboratory, HERB MOOK, Oak Ridge National Laboratory, YOICHI ANDO, SEIKI KOMIYA, CRIEPI, Japan — We use high-resolution inelastic neutron scattering to study the low-temperature magnetic excitations of electron-doped superconducting $Pr_{0.88}LaCe_{0.12}CuO_{4-\delta}$ (T_c=21 K) over a wide energy range (4 meV<hbar ω < 260 meV). The effect of electron-doping and superconductivity is to cause a wave vector broadening in the low-energy (<50 meV) commensurate spin fluctuations at (π, π) and to suppress the intensity of spin-wave-like excitations at high energies (> 80 meV). This leads to a substantial redistribution in the spectrum of the local dynamical spin susceptibility χ"(ω), and reveals a new energy scale considerably smaller than that of the hole-doped materials [1]. [1] Stephen D. Wilson et. al., PRL submitted (2005).

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