Abstract Submitted
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Persistent spin excitations in doped cuprates revealed by resonant inelastic light scattering C.J. JIA, Stanford University/SLAC, E.A. NOWADNICK, Columbia University, K. WOHLFELD, SLAC, Y.F. KUNG, Stanford University/SLAC, C.-C. CHEN, Argonne, S. JOHNSTON, Univ. of British Columbia, T. TOHYAMA, Kyoto University, B. MORITZ, SLAC, Univ. of North Dakota, T.P. DEVEREAUX, SLAC — How coherent quasiparticles emerge upon doping a quantum antiferromagnet is a key question in correlated materials, underlying an understanding of the cuprate phase diagram. Recent resonant inelastic x-ray scattering (RIXS) experiments in hole-doped cuprates measured high energy collective spin excitations that persist well into the overdoped regime and bear a striking resemblance to those found in the parent compound, challenging the perception that spin excitations should weaken with doping and have a diminishing effect on superconductivity. We show that RIXS at the Cu L3-edge indeed provides access to the spin dynamical structure factor once one considers the full influence of light polarization. Further we demonstrate that high-energy spin excitations do not correlate with the doping dependence of Tc, while low-energy excitations depend sensitively on doping and show a crossover from antiferromagnetic to ferromagnetic correlations. This suggests that although high-energy spin excitations persist well into the overdoped regime, they are marginal to pairing in cuprate superconductors.

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