Abstract Submitted
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Covalent magnetic form factor and neutron scattering in cuprates[1] IGOR ZALIZNYAK, ZHIJUN XU, GENDA GU, Brookhaven National Laboratory, ANDREI SAVICI, GARRETT GRANROTH, MATTHEW STONE, NSSD, Oak Ridge National Laboratory — We investigate the effect of covalent hybridization on magnetic excitations measured by the inelastic neutron scattering (INS) in the 1D cuprate Sr_2CuO_3 and the 2D La_2CuO_4. It has been previously shown that strong hybridization of Cu 3d states with O p states leads to the dramatic modification of the measured INS intensity, which is strongly suppressed, by factor 2.5-3, compared to the ionic spin model [1]. The result was obtained by comparing the measured intensity in a chain cuprate Sr_2CuO_3 with the dynamical spin structure factor predicted by the exact theory [2] of the model spin-1/2 Heisenberg Hamiltonian, which is typically used for cuprates. In the present follow-up study we extend these measurements so as to probe directly the wave vector dependence of the magnetic form factor, which is the Fourier transform of the magnetic electron's density, both in Sr_2CuO_3, and in the LSCO parent material, the two-dimensional La_2CuO_4. Our results yield a model-independent measurement of the magnetic form factor and provide an explanation for the suppressed magnetic intensity in La_2CuO_4 and other cuprates.

[1] A. Walters, *et. al*, Nature Physics **5**, 867 (2009).
[2] J.-S. Caux, R. Hagemans, J. Stat. Mech., **P12013** (2006)

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