

Supplementary Information for Spin excitations of ferronematic order in undoped cuprate superconductors

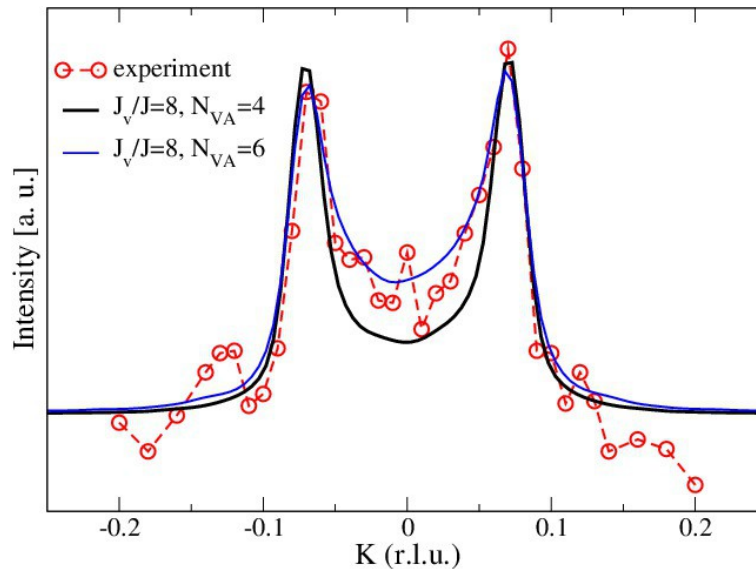
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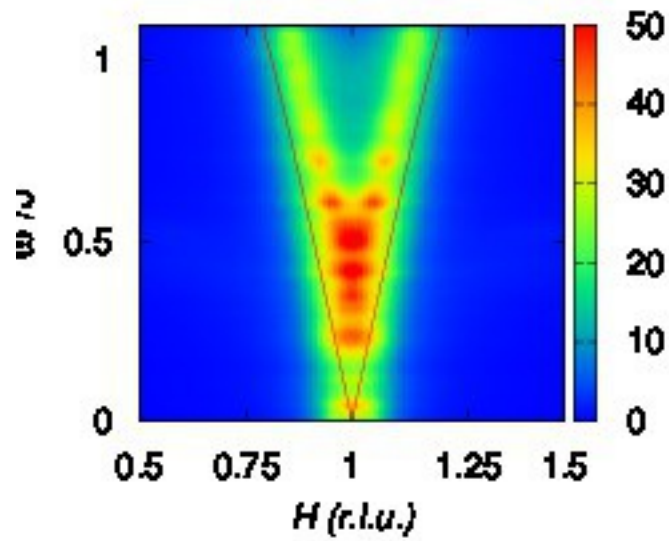
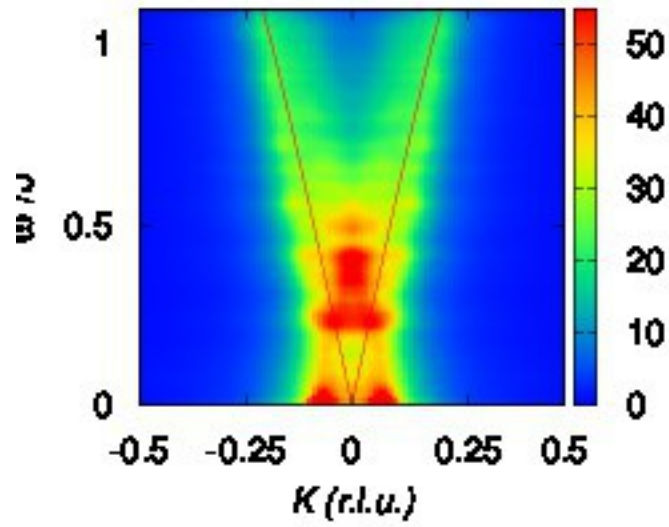
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Here we demonstrate that the static and dynamic spin structure factor of the ferronematic is not sensitively dependent of the particular choice of the exchange coupling J_v/J . In particular, we present results for $J_v/J=8$ which within the Heisenberg model reproduces the spin structure obtained within a Gutzwiller variational calculation (cf. Methods section). Fig. S1 demonstrates that $J_v/J=8$ yields the same incommensurability than $J_v/J=1.5$ (cf. panel (b) of Fig. 1). The larger ratio leads to slightly sharper peaks in momentum space so that also segments with 3 vortex-antivortex pairs (blue curve in Fig. S1) yield a reasonable fit to the data. The dynamic structure factor for two cuts, perpendicular and parallel to the direction of segments is shown in Fig. S2. Clearly the results for $J_v/J=8$ are similar to those for $J_v/J=1.5$ shown in Fig. 4, also concerning the energy of E_{cross} .



Supplemental Figure S1 | Static spin structure factor of the ferronematic for $J_v/J=8$. Black line: segments consist of 2 vortex-antivortex pairs ($N_{\text{VA}}=4$); Blue line: segment length corresponds to 3 vortex-antivortex pairs ($N_{\text{VA}}=6$). Experimental data points by courtesy of S. Wakimoto.



Supplemental Figure S2 | Intensity plot of the cross section $\omega S_q(\omega)$ for $J_v/J=8$. Upper panel: momentum cut through Q_{AF} perpendicular to the segments. Lower panel: Momentum cut through Q_{AF} parallel to the segments.