Rønnow *et al.* **Reply:** In a recent Letter we reported on a comprehensive investigation of the magnetic excitation spectrum of $Cu(DCOO)_2 \cdot 4D_2O$, an excellent realization of a 2D quantum ($S = 1/2$) Heisenberg antiferromagnet on a square lattice [1]. We obtained renormalization factors of $Z_c = 1.21 \pm 0.05$ and $Z_\chi = 0.51 \pm 0.04$ at low temperature, in good agreement with theory, and discovered a wave-vector dependent quantum renormalization of the excitation energies. By comparing to exact diagonalization and quantum Monte Carlo (QMC) computations, this was shown to be a feature intrinsic to the model. Finally, we studied the temperature dependence of the softening and damping, $\Gamma(T)$, of the magnetic excitations. The former was shown to be consistent with higher-order quantum corrections to spin-wave theory, while the latter was in excellent agreement with QMC. We noticed that the damping of the spin waves is in *surprisingly good agreement* with the simple relation $\Gamma(T) = v_s(T)/\xi(T)$, where $v_s(T)$ and $\xi(T)$ are the spin-wave velocity and correlation length, respectively. In their Comment [2], Kopietz and Spremo address this last observation and propose an alternative functional form for $\Gamma(T)$ [3].

The magnon damping rate shown in Fig. 1 was extracted by fitting a damped harmonic oscillator line shape to the experimentally measured $S(\mathbf{k}, \omega)$ (see [4] for details). Within the statistical accuracy of the measurements, no systematic $\mathbf{k}$ dependence of the damping could be observed. Therefore, to ameliorate statistical quality, we presented an *average* of $\Gamma_\mathbf{k}(T)$ over $\frac{1}{4a} < |k| < \pi/\sqrt{2}a$. The validity of this averaging is confirmed by the excellent agreement with the QMC data taken *at* $\mathbf{k} = (\frac{\pi}{2a}, \frac{\pi}{2a})$.

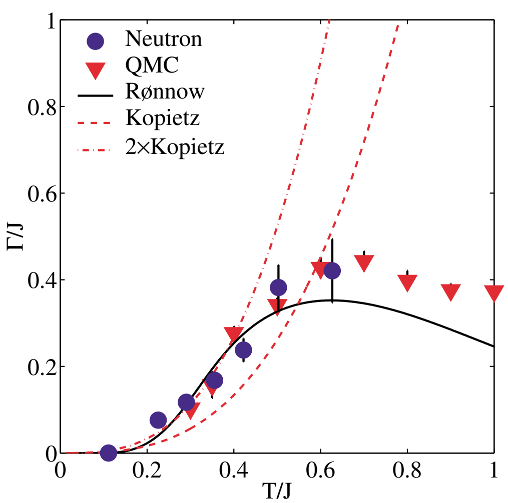

FIG. 1 (color online). Temperature dependence of the damping rate in the 2DQHAFSL. Experimental neutron scattering data (circles) and QMC data (triangles) are in perfect agreement, and are well described by $\Gamma(T) = v_s(T)/\xi(T)$ (solid line). The expression proposed in [2] (dashed line) can be brought to reasonable agreement up to $T \lesssim 0.4J$ if multiplied by a factor of 2 (dot-dashed line).

The functional form $\Gamma(T) = \frac{2\pi}{3} Z(|v_k|) J (\frac{T}{J})^3$ proposed in [2] is expected to be valid in the large-S and low-T limit for magnons of short wavelength $|k| \gtrsim \frac{2\pi}{a}[Ta/v_s(0)]^{1/3}$, where $v_s(0) = 2^{3/2} Z_c JSa$ and $Z_c = 1.18$. Even for the largest wave vector of the experiment, $|k| = \pi/\sqrt{2}\,a$, this leads to the requirement $T \lesssim \frac{Z_c J}{16}$, below the experimentally covered temperature range. Still, it is remarkable that allowing a scale factor of ~2 the expansion can describe the data up to $T \lesssim 0.4J$. This renormalization factor may arise from fluctuations not included in the large-S expansion. The QMC results demonstrate that the damping saturates at higher temperatures, and this effect is not captured by the low-T expansion.

The behavior over the whole temperature range of the measurements and the QMC calculations could be described by the form $\Gamma(T) = v_s(T)/\xi(T)$, for which we have presented a simple phenomenological interpretation: Assume that an excitation belongs to a correlated region of finite spatial extent $\xi(T)$. Its lifetime, $1/\Gamma(T)$, will be limited to the time it takes for the excitation to propagate across the correlated region, $\xi(T)/v_s(T)$. It must be clarified that this argument can be expected to hold for $|k|$ *larger* than $1/\xi(T)$ [5,6]. At wavelengths longer than the correlation length spin waves become unstable and overdamped.

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