

Erratum: Breakdown of chiral edge modes in topological magnon insulators [Phys. Rev. B **109**, 024441 (2024)]

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The spectral functions presented in Figs. 3 and 4 in this paper are inaccurate due to a minor bug in the code, in which incorrect matrix elements were used to compute the self-energy. The bug also affected the quantitative results for the edge-bulk and edge-edge hybridization strengths in Figs. 7 and 8. However, the qualitative results of the paper remain correct. In the following, we discuss the relevant changes in detail.

Updated spectral functions for zigzag and dangling edge terminations are shown in Figs. 1(a) and 1(b). Notably, a new spectral weight is observed within the band gap at $\omega \approx 2.6JS$, which was absent in the original figures. This spectral weight also appears in the spectral function with periodic boundary conditions [Fig. 1(c)], suggesting that it arises solely from bulk modes. These modes are likely shifted from the lower edge of the upper band into the gap due to level repulsion effects and are unrelated to the edge modes. The presence of such a bulk spectral weight inside the gap challenges the simple picture of well-defined edge modes in the gap of bulk excitations. In fact, the spectral function shows no in-gap features that could correspond to any reasonably sharp edge excitation. Thus, we conclude that the edge modes are completely overdamped, validating the main conclusions of the paper.

Furthermore, we reexamine the edge-bulk and edge-edge hybridization strengths discussed in Sec. V of this paper. Figure 2 presents the updated calculation of the edge-bulk hybridization strength w , plotted against the number of unit cells N_y in the nonperiodic direction. The quantity w is defined as in Eq. (19) and is again evaluated for dangling edges at the corresponding momentum k_x^* , indicated by the dashed white line in Fig. 1(b). We once again observe a convincing convergence of w towards a finite value, reaffirming the qualitative conclusions regarding edge-bulk hybridization. The precise value is slightly larger in the corrected calculation, converging to approximately $0.0182JS$ as N_y increases, larger than the limit $0.016JS$ reported originally.

Figure 3 illustrates the edge-edge hybridization strength v as a function of N_y . The quantity v is defined below Eq. (20) and is evaluated for zigzag edges at the M point. The data clearly show that v decays exponentially with increasing N_y , as previously described. An exponential fit (green line) yields a localization length of approximately 46 unit cells, closely matching the value of 52 unit cells originally reported. Thus, we confirm that the previously reported conclusions regarding edge-edge hybridization remain qualitatively valid.

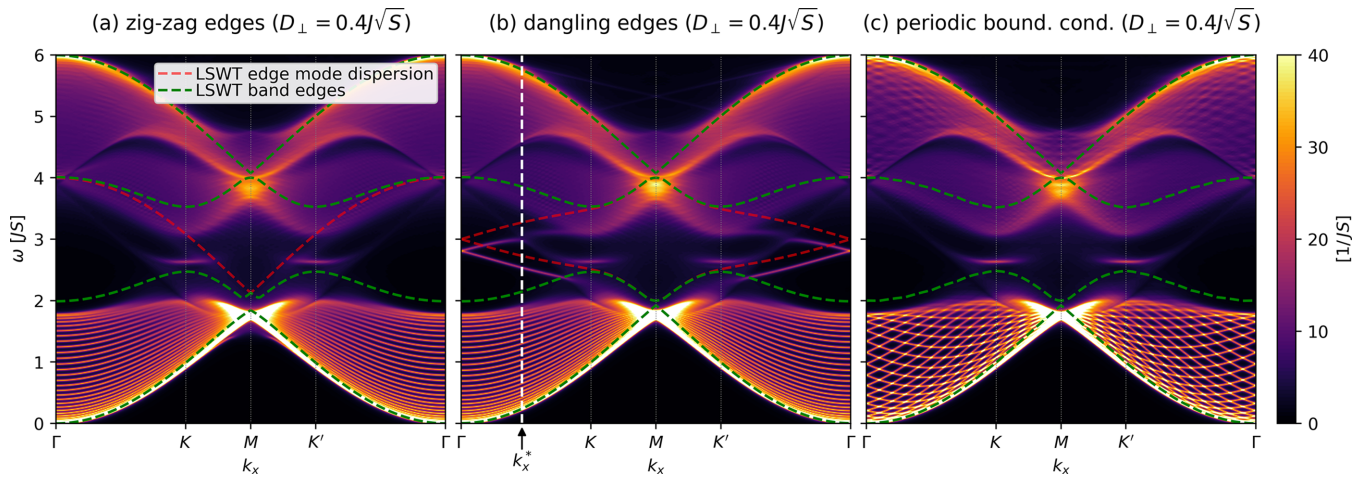


FIG. 1. Single-magnon spectra for the strip ($N_y = 30$, $D_{\parallel} = 0.1JS$, numerical line broadening $0.01JS$) with (a) zigzag edge termination, (b) dangling edge termination, and (c) periodic boundary conditions. A previously unobserved spectral weight appears inside the bulk gap due to delocalized bulk states. In contrast, the edge modes still vanish from the spectrum.

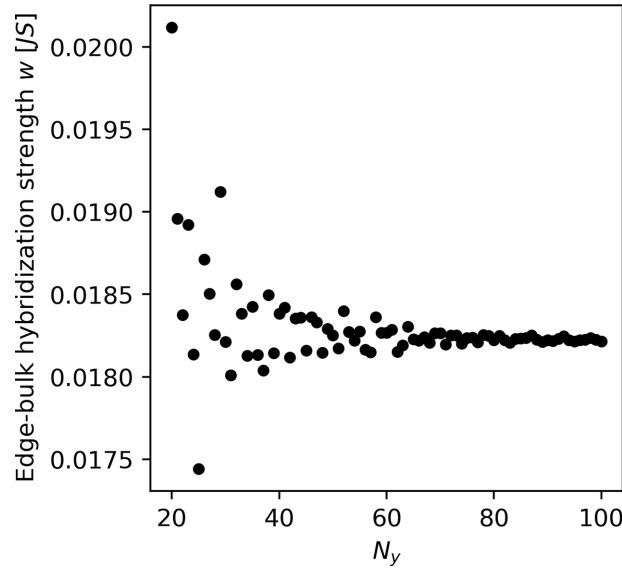


FIG. 2. Edge-bulk hybridization strength w vs the number of unit cells in the y direction for interaction strength $D_{\perp} = 0.4J\sqrt{S}$. The data points approach a constant ≈ 0.0182 in the thermodynamic limit, signifying a stable edge-bulk hybrid state extending over the whole system.

In addition, there are a couple of minor typos in Appendix C. First, the precursor vertex factors $f_{k_x, q_x, k_x - q_x}^{nml}$ should read

$$f_{k_x, q_x, k_x - q_x}^{nml} = \frac{i}{\sqrt{2}} \sum_y \sum_{(\delta x, \delta y) \in \text{nnn}(y)} \mathcal{U}_{ny}^*(k_x - q_x) \mathcal{U}_{m, y + \delta y}^*(q_x) (\mathcal{U}_{l, y + \delta y}(k_x) e^{-i(k_x - q_x)\sqrt{3}\delta x} - \mathcal{U}_{ly}(k_x) e^{+iq_x\sqrt{3}\delta x}),$$

the only difference being in the momentum-dependent phase factors. However, we note that the symmetrized vertex factor g_{k_x, q_x}^{nml} computed in Appendix C and used throughout the main text is correct regardless.

Second, the expressions for the three-magnon Hamiltonian $\hat{H}_3$ directly above and below the equation for $f_{k_x, q_x, k_x - q_x}^{nml}$ are missing the Hermitian conjugates (“+H.c.”).

Third, in the equation below $f_{k_x, q_x, k_x - q_x}^{nml}$, there is a superfluous factor of $\sqrt{S}$ in the three-magnon Hamiltonian. It should read

$$\hat{H}_3 = \frac{D_{\perp}\sqrt{S}}{\sqrt{N_x}} \sum_{nml} \sum_{k_x, q_x \in \text{BZ}} f_{k_x, q_x, k_x - q_x}^{nml} a_{k_x - q_x, n}^{\dagger} a_{q_x, m}^{\dagger} a_{k_x, l} + \text{H.c.}$$

Acknowledgment. We would like to thank J. G. Rau for bringing these errors to our attention.

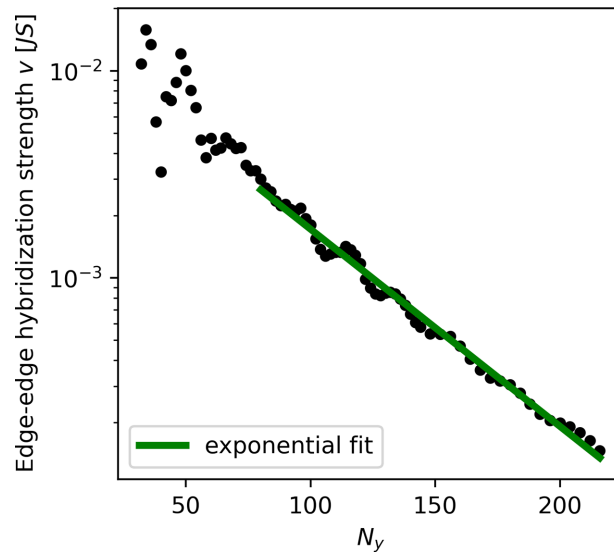


FIG. 3. Edge-edge hybridization strength v vs N_y for zero magnetic field on a semilog scale. An exponential function is fitted in the interval between $N_y = 80$ and 216; its decay length is about 46 unit cells, much larger than the linear spin-wave theory edge mode localization length of 0.97 unit cells.