

Erratum: Josephson effect and odd-frequency pairing in superconducting junctions with unconventional magnets [Phys. Rev. B **111, 064502 (2025)]**

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After the publication of our paper, we were aware of the missing equation for calculating the Josephson current on p. 4. The correct formulation of supercurrents on p. 4 is given by [1]

$$I(\varphi) = \frac{ie}{\hbar} \int_{-\pi}^{\pi} \text{Tr}' T \sum_{i\varepsilon_n} [\hat{t}_N^\dagger(k_y) \hat{G}_{01}(k_y, i\varepsilon_n) - \hat{t}_N(k_y) \hat{G}_{10}(k_y, i\varepsilon_n)] dk_y. \quad (1)$$

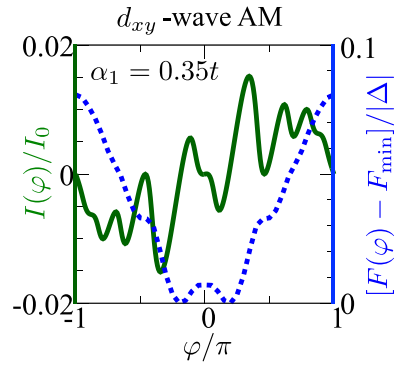


FIG. 6. Josephson current $I(\varphi)$ and the corresponding free energy $F(\varphi) = \frac{\hbar}{2e} \int_{-\pi}^{\pi} I(\varphi) d\varphi$ as a function of the superconducting phase difference φ for Josephson junctions with d_{xy} -wave alternangets. The green-solid and blue-dotted lines mean the Josephson current $I(\varphi)$ and the corresponding free energy $F(\varphi) - F_{\min}$, respectively. The strength of the magnetic order is chosen as $\alpha_1 = 0.35t$. Here, I_0 and $F_{\min} = \min[F(\varphi)]$ stand for the critical current without the magnetic order and the minimum value of the free energy, respectively. Parameters: $\mu = 1.5t$, $T = 0.025T_c$, $T_c = 0.01t$, $t_{\text{int}} = 0.95$, and $N = 30$.

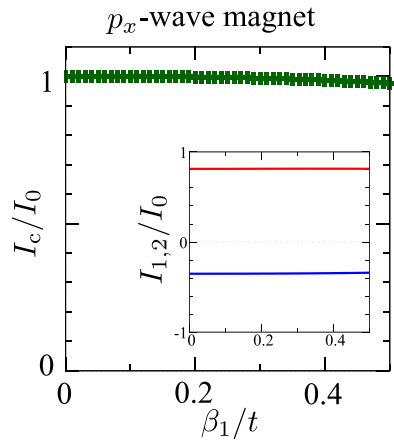


FIG. 7. The critical current I_c as a function of the magnetic order strength β_1 for the Josephson junctions based on unconventional p_x -wave magnets. I_0 indicates the critical current without any unconventional magnetic order. The inset shows the first and second harmonics $I_{1,2}$ of the supercurrent decomposed as in Eq. (17). Parameters are the same as in Fig. 6.

We also noticed that we used the incorrect codes when calculating the Josephson current for the d_{xy} altermagnet and p_x wave unconventional magnet. The correct Fig. 6(a) is shown above, at $\alpha_1 = 0.35t$. In the revised result, the effect of higher harmonics becomes more remarkable, and the φ junction [2], which has the minimal energy of the free energy $F(\varphi)$ except for $\varphi = 0, \pi$, also emerges at $\alpha_1 = 0.35t$.

The correct Fig. 7(c) is plotted above. In Fig. 7(c), the qualitative result does not change remarkably.

The main result, discussion, and conclusion are unaffected by the Erratum.

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- [1] Y. Fukaya, Y. Tanaka, P. Gentile, K. Yada, and M. Cuoco, Anomalous Josephson coupling and high-harmonics in non-centrosymmetric superconductors with s -wave spin-triplet pairing, [npj Quantum Mater.](#) **7**, 99 (2022).
 - [2] Y. Tanaka and S. Kashiwaya, Theory of Josephson effects in anisotropic superconductors, [Phys. Rev. B](#) **56**, 892 (1997).