

Erratum: Vestigial d -wave charge- $4e$ superconductivity from bidirectional pair density waves [Phys. Rev. B **113, 045121 (2026)]**

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Upon reexamining our results, we discovered a single inconsistency in our paper, which we have corrected below. The half vortex–single dislocation (HVSD) pairs identified in Sec. II C, given by Eq. (15), are inconsistent with the defining relation Eq. (7) for the phases when the $4e$ -SC phases are locked: $2\theta - 2\bar{\theta} = \pm\pi$. Such defects violate the single-valued nature of the pair density wave order parameters, and the correct HVSD defects for our model are

$$q = (\pm\frac{1}{2}, \pm\frac{1}{2}, \pm\frac{1}{2}) \quad (\text{HVSD}), \quad (1)$$

which physically bind half superconducting (SC) vortices to single charge density wave (CDW) dislocations in *both* directions, rather than a single direction.

The defects (1) serve the same purpose; they still carry a SC flux quantum of $\Phi_0/2 = hc/4e$ and restore both $U(1)$ and translation invariance upon proliferation. The corrected sine-Gordon action, previously Eq. (22), is

$$S_{\text{SG}} = \int_x \left[\frac{T}{2(\kappa_1 + \kappa_2)} |\nabla \vartheta|^2 + \frac{T}{2\sqrt{\kappa_1 \kappa_2}} (|\mathbf{D}\varphi|^2 + |\mathbf{D}'\bar{\varphi}|^2) - g_{\text{fv}} \cos(2\pi\vartheta) - g_{\text{dd}} [\cos(2\pi\varphi) + \cos(2\pi\bar{\varphi})] - 4g_{\text{hvds}} \cos(\pi\vartheta) \cos(\pi\varphi) \cos(\pi\bar{\varphi}) \right], \quad (2)$$

where only the cosine operator for HVSDs has been replaced. This augments the scaling dimension Δ_{hvds} in Eq. (26) to

$$\Delta_{\text{hvds}} = \Delta_{\vartheta,1} + \Delta_{\varphi,1} + \Delta_{\bar{\varphi},1} = \frac{\pi}{4T} (\kappa_1 + \kappa_2 + 2\sqrt{\kappa_1 \kappa_2}), \quad (3)$$

with a factor of 2 in front of $\sqrt{\kappa_1 \kappa_2}$, which alters the relevance line [Eq. (29)] for HVSDs:

$$\frac{\kappa_1 + \kappa_2}{T} + 2 \frac{\sqrt{\kappa_1 \kappa_2}}{T} < \frac{8}{\pi} \quad (\text{for HVSD}). \quad (4)$$

The updated phase diagram (previously Fig. 2) is shown in Fig. 1. The relevance lines for HVSD's and double dislocations now intersect only for $\kappa_1 = \kappa_2$, and for sufficient anisotropy the system still accesses a sizable intermediate phase of d -wave charge- $4e$ SC order. Our conclusion that a d -wave charge- $4e$ SC order exists at intermediate temperature is unchanged. The threshold value of $\kappa_1/\kappa_2 \approx 6.85$ is retracted.

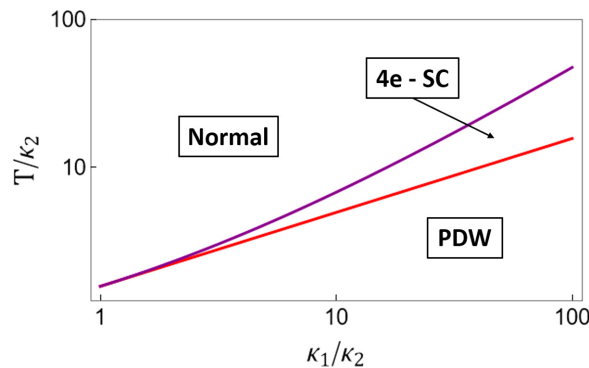


FIG. 1. Log-log plot of the double CDW relevance line Eq. (28) in the original paper and the updated HVSD relevance line (4). The red line signifies the proliferation of double CDW dislocations, whereas the purple line signifies the proliferation of HVSDs. The two lines intersect for $\kappa_1/\kappa_2 = 1$.