Erratum: Exact correlation functions in the cuprate pseudogap phase: Combined effects of charge order and pairing [Phys. Rev. B **90, 220513(R) (2014)]**

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(Received 5 March 2017; published 30 March 2017)

DOI: [10.1103/PhysRevB.95.099904](https://doi.org/10.1103/PhysRevB.95.099904)

There is an error in Eq. (1) of the main text, which reports the self-energy of the Amperean pairing scenario. As the error concerns the case where $C_1 \neq 0$, $C_2 \neq 0$, none of the conclusions of the paper are affected since, apart from Eq. (1), only the limit $C_1 = C_2 = 0$ was considered in the main text. Thus the numerical calculations in the Results section remain valid. For completeness there are, however, 21 total Feynman diagrams now and not 9 as stated on p. 3 of the main text. As a result of this error, Eqs. (3), (11), (13), and (26) in the Supplemental Material also are incorrect. The correct expression for Eq. (1) of the main text should be

$$\begin{aligned} \Sigma_{pg}(K) = & \frac{\Delta_1^2}{\omega + \xi_{\mathbf{k}-\mathbf{p}} - \frac{\Delta_2^2}{\omega - \xi_{\mathbf{k}-2\mathbf{p}}}} + \frac{\Delta_2^2}{\omega + \xi_{\mathbf{k}+\mathbf{p}} - \frac{\Delta_1^2}{\omega - \xi_{\mathbf{k}+2\mathbf{p}}}} + \frac{C_1^2}{\omega - \xi_{\mathbf{k}+2\mathbf{p}} - \frac{\Delta_1^2}{\omega + \xi_{\mathbf{k}+\mathbf{p}}}} + \frac{C_2^2}{\omega - \xi_{\mathbf{k}-2\mathbf{p}} - \frac{\Delta_2^2}{\omega + \xi_{\mathbf{k}-\mathbf{p}}}} \\ & + \frac{2\Delta_1\Delta_2C_1}{(\omega - \xi_{\mathbf{k}+2\mathbf{p}})(\omega + \xi_{\mathbf{k}+\mathbf{p}}) - \Delta_1^2} + \frac{2\Delta_1\Delta_2C_2}{(\omega - \xi_{\mathbf{k}-2\mathbf{p}})(\omega + \xi_{\mathbf{k}-\mathbf{p}}) - \Delta_2^2}, \end{aligned} \quad (1)$$

where $\xi_{\mathbf{k},1} = \xi_{\mathbf{k}+\mathbf{p}}$, $\xi_{\mathbf{k},2} = \xi_{\mathbf{k}-\mathbf{p}}$, $\xi_{\mathbf{k},3} = \xi_{\mathbf{k}+2\mathbf{p}}$, and $\xi_{\mathbf{k},4} = \xi_{\mathbf{k}-2\mathbf{p}}$. Using this self-energy and the Ward-Takahashi identity, the corrected full vertex is

$$\begin{aligned} \Gamma^\mu(\tilde{K}, K) = & \gamma^\mu(\tilde{K}, K) + \Delta_1^2 G_{1,1}(-K) [\gamma_1^\mu(-K, -\tilde{K}) + \Delta_2^2 G_{0,4}(\tilde{K}) \gamma_4^\mu(\tilde{K}, K) G_{0,4}(K)] G_{1,1}(-\tilde{K}) \\ & + \Delta_2^2 G_{1,2}(-K) [\gamma_2^\mu(-K, -\tilde{K}) + \Delta_1^2 G_{0,3}(\tilde{K}) \gamma_3^\mu(\tilde{K}, K) G_{0,3}(K)] G_{1,2}(-\tilde{K}) \\ & + C_1^2 G_{1,3}(\tilde{K}) [\gamma_3^\mu(\tilde{K}, K) + \Delta_1^2 G_{0,2}(-K) \gamma_2^\mu(-K, -\tilde{K}) G_{0,2}(-\tilde{K})] G_{1,3}(K) \\ & + C_2^2 G_{1,4}(\tilde{K}) [\gamma_4^\mu(\tilde{K}, K) + \Delta_2^2 G_{0,1}(-K) \gamma_1^\mu(-K, -\tilde{K}) G_{0,1}(-\tilde{K})] G_{1,4}(K) \\ & + \Delta_1 \Delta_2 C_1 G_{1,3}(K) G_{0,2}(-K) \gamma_2^\mu(-K, -\tilde{K}) G_{0,2}(-\tilde{K}) \\ & - \Delta_1 \Delta_2 C_1 G_{0,2}(-\tilde{K}) G_{1,3}(\tilde{K}) [\gamma_3^\mu(\tilde{K}, K) + \Delta_1^2 G_{0,2}(-K) \gamma_2^\mu(-K, -\tilde{K}) G_{0,2}(-\tilde{K})] G_{1,3}(K) \\ & + \Delta_1 \Delta_2 C_1 G_{1,2}(-K) [\gamma_2^\mu(-K, -\tilde{K}) + \Delta_1^2 G_{0,3}(\tilde{K}) \gamma_3^\mu(\tilde{K}, K) G_{0,3}(K)] G_{1,2}(-\tilde{K}) G_{0,3}(\tilde{K}) \\ & - \Delta_1 \Delta_2 C_1 G_{0,3}(\tilde{K}) \gamma_3^\mu(\tilde{K}, K) G_{0,3}(K) G_{1,2}(-K) \\ & + \Delta_1 \Delta_2 C_2 G_{1,4}(K) G_{0,1}(-K) \gamma_1^\mu(-K, -\tilde{K}) G_{0,1}(-\tilde{K}) \\ & - \Delta_1 \Delta_2 C_2 G_{0,1}(-\tilde{K}) G_{1,4}(\tilde{K}) [\gamma_4^\mu(\tilde{K}, K) + \Delta_2^2 G_{0,1}(-K) \gamma_1^\mu(-K, -\tilde{K}) G_{0,1}(-\tilde{K})] G_{1,4}(K) \\ & + \Delta_1 \Delta_2 C_2 G_{1,1}(-K) [\gamma_1^\mu(-K, -\tilde{K}) + \Delta_2^2 G_{0,4}(\tilde{K}) \gamma_4^\mu(\tilde{K}, K) G_{0,4}(K)] G_{1,1}(-\tilde{K}) G_{0,4}(\tilde{K}) \\ & - \Delta_1 \Delta_2 C_2 G_{0,4}(\tilde{K}) \gamma_4^\mu(\tilde{K}, K) G_{0,4}(K) G_{1,1}(-K). \end{aligned} \quad (2)$$

This agrees with Eq. (10) of the main text for the case of $C_1 = C_2 = 0$. Given the full and bare vertices Γ^μ, γ^ν , the full response functions are then

$$P^{\mu\nu}(Q) = 2 \sum_K G(\tilde{K}) \Gamma^\mu(\tilde{K}, K) G(K) \gamma^\nu(K, \tilde{K}). \quad (3)$$

The above equation, with the full vertex from Eq. (2), corrects Eqs. (3) and (13) of the Supplemental Material. There are 21 Feynman diagrams that contribute to the response functions and not 9 as stated on p. 3 of the main text; there are an additional 12 diagrams with an odd number of Green's functions. The Feynman diagrams are shown in Fig. 1 which corrects Fig. 1 of the Supplemental Material. The response functions are completely specified once the various bare vertices are given. In the limit $\mathbf{q} \rightarrow 0$, the bare vertices become $\gamma_i^\mu(\tilde{K}, K) = (1, \partial \xi_{\mathbf{k}+\mathbf{q}/2, i} / \partial \mathbf{k})$. Inserting this definition of the bare vertices into Eq. (2) above, using the definitions of the various dispersion relations, and then inserting the resulting full vertex into Eq. (3) gives the small $\mathbf{q}$ response function which corrects Eq. (11) of the Supplemental Material. Using the corrected full vertex and response functions from Eqs. (2) and (3), the transverse sum rule can be proved exactly. The proof is identical with Sec. II C of the Supplemental Material only with the corrected Green's function [computed using the self-energy in Eq. (1) above] and the corrected response functions above being used in place of Eq. (13) of the Supplemental Material. The spin response functions can be computed in a similar manner as the charge response. By making the substitutions $\gamma_i^\mu(\tilde{K}, K) \rightarrow \gamma_{i, S_\sigma}^\mu(\tilde{K}, K)$, $\gamma_i^\mu(-K, -\tilde{K}) \rightarrow \gamma_{i, S_\sigma}^\mu(-K, -\tilde{K})$ and $2 \sum_K \rightarrow \sum_\sigma \sum_K$ in the charge response in Eq. (3), the exact spin response is obtained, and this then corrects Eq. (26) of the Supplemental Material.

FIG. 1. All 21 Feynman diagrams which contribute to the response functions $P^{\mu\nu}(Q)$. The wavy lines denote either Δ_1 or Δ_2 , whereas the dashed lines denote either C_1 or C_2 . The various Green's functions are labeled. The order of the Feynman diagrams from left to right and top to bottom corresponds to the terms appearing in Eq. (2).