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In our original paper we proposed a diagrammatic approach to generate approximate spectral function with the positive semidefiniteness (PSD) property. The proposed approach stands as is, but we have missed a diagram in the PSD self-energy of Fig. 15. Specifically, the fourth partition in Fig. 10, named $\Sigma_5$ in our original paper, can be written in terms of half-diagrams as illustrated in Fig. 13. If one properly labels the dangling lines (see Fig. 1), then $\Sigma_5$ reads

$$\Sigma_5^{<} = i \sum_{i_1,j_1;i_2} \sum_{p_1,p_2} \sum_{p_1'} D^{i_1,j_1}_{p_1,p_2,p_1';p_1',p_2} D^{i_2,j_2}_{p_1,p_2,p_1';p_1',p_2}$$  \hspace{1cm} (1)$$

which differs from the last term of Eq. (44) since in $D^\ast$ the indices $(p_1, p_2)$ and $(q_1, q_2)$ are interchanged with respect to $D$. As a consequence $\Sigma_5$ is not a perfect square. According to the rules in Eqs. (30)–(32) the additional partition to consider for restoring

![Diagram](image1.png)

FIG. 1. Same as Fig. 13 but with labels on the dangling lines.
The PSD property leads to

\[ \Sigma_{5,\text{PSD}} = \sum_{i,j=1}^{\infty} \sum_{P \in \pi_2} D_{i,j}^{(i,j)}(D_{i,j}^{(i,j)^\ast} + D_{i,j}^{(i,j)^\ast}) \]

(2)

whose diagrammatic representation is given in Fig. 2.

The first partition in Fig. 2 is contained in the second diagram of Fig. 15. Instead the second partition should be added to the diagrams of Fig. 15 to guarantee the PSD property. Notice that the added partition contains a \(GW\) self-energy insertion. Therefore, if one works with \(GW\) Green’s functions this partition should be discarded for otherwise a double counting would occur.

In conclusion, the correct expression for the PSD self-energy with vertex correction and random-phase approximation (RPA) screened interaction reads

\[ \Sigma_{\text{PSD}} = i \sum_{i,j=1}^{\infty} \sum_{P \in \pi_2} (-)^P \sum_{PQ} (D_{i,j}^{(i,j)} + \tilde{D}_{i,j}^{(i,j)^\ast})(D_{i,j}^{(i,j)^\ast} + \tilde{D}_{i,j}^{(i,j)^\ast}) \]

(3)

and Fig. 15 should be replaced by Fig. 3 below.