Erratum: Screening and nonlocal correlations in the extended Hubbard model from self-consistent combined GW and dynamical mean field theory [Phys. Rev. B **87, 125149 (2013)]**

Thomas Ayral, Silke Biermann, and Philipp Werner
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Section V, step 5(a) of this paper contains two errors in the description of the many-body self-energy that was used in the combined GW +extended dynamical mean field theory (EDMFT) calculations to obtain the results plotted in Figs. 12, 13, 14, and 15. The first one is a typo, while the second one is more fundamental and also affects the GW +EDMFT results in Refs. [1,2]. While the results in these papers are valid, the GW +EDMFT data correspond to a slightly different model than indicated, due to the omission of the nonlocal Fock term.

First, the sign in the second term of the equation for the GW self-energy (the second line in the second expression of point 5(a) in Sec. V), is wrong. The correct expression is

$$\Sigma^{GW}(\mathbf{k}, \tau) = - \sum_{\mathbf{q}} G(\mathbf{q}, \tau) W^c(\mathbf{k} - \mathbf{q}, \tau) - \sum_{\mathbf{q}} G_{\mathbf{q}+\mathbf{k}}(\tau = 0^+) v_{\mathbf{q}}. \quad (1)$$

The second issue concerns the nonlocal Fock term, which we erroneously assumed to vanish in this work and in Refs. [1,2]. While this term should be, and is, included in the equations describing the GW +EDMFT formalism, it was set to zero in the actual calculations. Hence the results in Figs. 2, 3(a), 3(b), and 4 of Ref. [1], Figs. 12, 13, 14, and 15 of this paper, and Figs. 11, 12, 13, and 14 of Ref. [2] were obtained with the GW self-energy

$$\Sigma^{GW}(\mathbf{k}, \tau) = - \sum_{\mathbf{q}} G(\mathbf{q}, \tau) W^c(\mathbf{k} - \mathbf{q}, \tau), \quad (2)$$

and should thus be considered as results for a model in which the effect of the nonlocal Fock term is already included at the level of the one-particle dispersion.

While the nonlocal Fock term vanishes trivially in the limit $V = 0$, it is nonzero and static for $V > 0$. Its effect is a band widening that can substantially increase the one-particle bandwidth, and does so in an explicitly V -dependent and implicitly U -dependent manner. Its quantitative effect on the dispersion is illustrated in Fig. 1, which shows results for $U = 2, V = 0.4$ and

FIG. 1. Bare dispersion $\varepsilon(\mathbf{k})$ (solid black lines), nonlocal Fock self-energy $\Sigma_F^{\text{nonloc}}(\mathbf{k})$ (solid blue line), and renormalized dispersion $\tilde{\varepsilon}(\mathbf{k})$ (dashed green line) along a high-symmetry path in the Brillouin zone in the GW +EDMFT method. Inset: Color plot of $\Sigma_F^{\text{nonloc}}(\mathbf{k})$ in the first Brillouin zone. The top panel shows data for $U = 2.0$ and $V = 0.4$, the bottom panel for $U = 3.0$ and $V = 1.0$ ($\beta = 100$).

$U = 3, V = 1$, respectively. In both panels, one also sees that the nonlocal Fock term can be absorbed into the bare dispersion $\varepsilon(\mathbf{k}) = -2t[\cos(k_y) + \cos(k_x)]$ by defining a U - and V -dependent hopping

$$\tilde{t}(U, V) = t + \delta t(U, V). \quad (3)$$

We note that standard EDMFT [3–5] does not include the nonlocal Fock term, while GW +EDMFT does. Our finding in this work, and in Refs. [1,2], that the effect of the nonlocal self-energy is to enhance local correlations is valid only if the effect of the nonlocal Fock term on the one-particle dispersion is treated consistently in both formalisms.

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