Erratum: Momentum-space cluster dual-fermion method [Phys. Rev. B **97, 125114 (2018)]**Urs R. Hähner, Sergei Isakov , Hanna Terletska, and Emanuel Gull

(Received 15 August 2019; published 29 October 2019)

DOI: [10.1103/PhysRevB.100.169906](https://doi.org/10.1103/PhysRevB.100.169906)

In the original paper, a momentum-space cluster dual-fermion formalism was derived and applied to the 2D Hubbard model on the square lattice at $U/t = 4.0$, $T/t = 0.5$, and half-filling. In the present erratum, we amend incorrect results in the original paper concerning the computation of the dual self-energy. While the derivation of the dual perturbation theory is correct, the numerical implementation included the first-order correction with the incorrect sign and assigned an extra prefactor of $1/N_c$ to each vertex. This resulted in incorrect plots for the self-energy (Fig. 4) and double occupancy (Fig. 5). Figures 1 and 2 of this erratum contain corrected versions of Figs. 4 and 5, respectively.

CORRECTION TO CONCLUSION

The corrected results change our conclusion in a substantial way. We conclude that in light of the above changes, the DCA does not provide a suitable starting point for a dual-fermion expansion to study the 2D Hubbard model without including additional higher order vertices. Computing these is presently beyond our capabilities.

FIG. 1. Comparison of the real (top panel) and imaginary (bottom panel) parts of the self-energy at the lowest Matsubara frequency. Solid red line: 4-site second-order DCA dual-fermion method. Solid blue line: single-site second-order dual-fermion method. Solid orange line: 4-site second-order DCA dual-fermion method with DCA Laue approximation. Dashed green line: 4-site DCA results. Dashed gray line: 64-site DCA results.

FIG. 2. Comparison of double-occupancy $\langle n_i n_i \rangle$ results obtained from the DCA DF method (blue cross) with single-site DMFT (black square), single-site dual-fermion (red plus), DCA DF with DCA Laue approximation (orange diamond), and data from the 2D Hubbard benchmark [1]. The dashed black line corresponds to DCA results extrapolated to the thermodynamic limit. The symbol size for the DCA results represents the stochastic error bars.

- [1] J. P. F. LeBlanc, A. E. Antipov, F. Becca, I. W. Bulik, Garnet Kin-Lic Chan, C.-M. Chung, Y. Deng, M. Ferrero, T. M. Henderson, C. A. Jiménez-Hoyos, E. Kozik, X.-W. Liu, A. J. Millis, N. V. Prokof'ev, M. Qin, G. E. Scuseria, H. Shi, B. V. Svistunov, L. F. Tocchio, I. S. Tupitsyn, S. R. White, S. Zhang, B.-X. Zheng, Z. Zhu, and E. Gull (Simons Collaboration on the Many-Electron Problem), *Phys. Rev. X* **5**, 041041 (2015).