

Supplemental Material for “Resummation of diagrammatic series with zero convergence radius for strongly correlated fermions”

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The equation of state can be expressed as density *vs.* chemical potential and temperature, $n(\mu, T)$. Thanks to scale invariance it reduces to a dimensionless function $n\lambda^3 = f(\beta\mu)$. Our results are given in Table S1. They were obtained using the ladder scheme for $\beta\mu < 0$ and the bold scheme for $\beta\mu \geq 0$. For cross-check, we also obtained $n\lambda^3 = 0.53346(7)$ at $\beta\mu = -1.5$ using the bold scheme, and $n\lambda^3 = 2.9033(26)$ at $\beta\mu = 0$ using the ladder scheme.

We went up to diagram orders $N_{\max} = 10$ at $\beta\mu \leq -1$, $N_{\max} = 8$ at $\beta\mu = 1.5$, and $N_{\max} = 9$ in all other cases.

The conformal-Borel transformation was applied to $Q(z) = [n(z) - n(0)]/z$ for the ladder scheme, and to $Q(z) = \Sigma(z)/z$ resp. $\Pi(z)/z$ for the bold scheme. The values used for the free parameter c were $c = 10$ for the bold scheme at $0 \leq \beta\mu \leq 1$, $c = 15$ at $\beta\mu = -0.5$ and $\beta\mu = 1.5$, $c = 13$ at $\beta\mu = 2$, $c = 20$ at $\beta\mu = -1$, and $c = 12$ in all other cases.

$\beta\mu$	$n\lambda^3$
-1.5	0.533477(45)
-1	0.94442(26)
-0.5	1.6735(8)
0	2.9049(26)
0.5	4.821(15)
1	7.54(4)
1.5	11.15(10)
2	15.60(12)
2.25	18.28(22)

TABLE S1: Density equation-of-state.

The pressure writes $P(\mu, T) = \int_{-\infty}^{\mu} d\mu' n(\mu', T)$ by the Gibbs-Duhem relation. In terms of dimensionless functions, $P(\mu, T)\beta\lambda^3 = F(\beta\mu) = \int_{-\infty}^{\beta\mu} dX f(X)$. We evaluate this integral numerically, using an interpolation of the data of Table S1, and the third-order virial expansion for $F(\beta\mu = -1.5)$ (using the fourth-order virial coefficient of [1] as an error estimate). The result is given in the ancillary file `pressure.txt`. The error bars include a conservative estimate of the error induced by the interpolation. Note that this also yields the energy per unit volume, which equals $3P/2$ by scale invariance [2].

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- [1] S. Endo and Y. Castin, J. Phys. A **49**, 265301 (2016).
[2] T.-L. Ho, Phys. Rev. Lett. **92**, 090402 (2004).