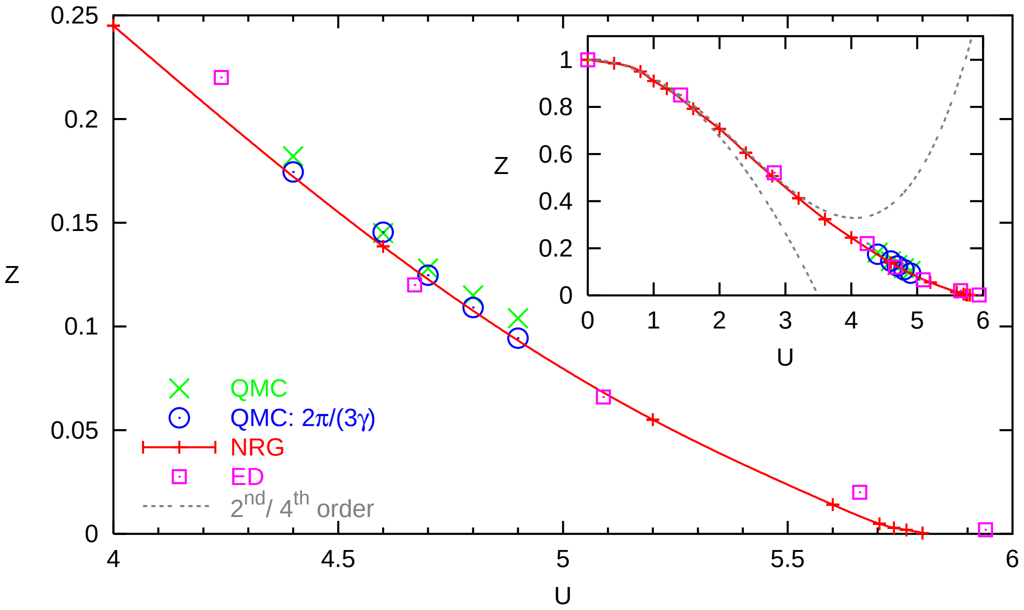

Figure 3.48: Quasiparticle weight Z at $T = 0$: QMC Eliashberg estimate for Z, extrapolated for $T \to 0$ (crosses), and estimate inferred from QMC fit for γ (cf. Fig. 3.46) in comparison with ground state results from perturbation theory (Noack and Gebhard, 1999), NRG (Bulla, 1999), and ED (Caffarel and Krauth, 1994).

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extrapolated to $T = 0$ using a purely quadratic fit in T^2 (lines).

The actual check of internal consistency is performed in Fig. 3.48. Here, large tilted crosses denote the direct QMC estimates of Z via the discrete difference expression (3.6) (in terms of the self-energy at the first Matsubara frequency) using the extrapolations illustrated in Fig. 3.47. Circles indicate the QMC estimates following from (3.48) and from the values for γ implied by the fits shown in Fig. 3.46. The good agreement between these sets of data confirms the internal consistency of our QMC estimates. Their reliability is further supported by the good agreement with estimates for Z obtained from NRG calculations (Bulla, 1999) (small crosses and solid line) and ED calculations (Caffarel and Krauth, 1994). The accuracy of these methods is, in turn, supported by perturbation theory of 2$^{\text{nd}}$ and 4$^{\text{th}}$ order [Noack and Gebhard (1999); see inset of Fig. 3.48]. The verification of the correct asymptotic slope of the fit curves shown in Fig. 3.46 implies the absence of significant systematic errors for the extrapolated ground-state energies. Therefore, the small deviations between the QMC estimates for E and the corresponding fit curve shown in Fig. 3.45 strongly support the accuracy of our ground state expressions (3.44) for $E_{\mathrm{m}}(U)$ and (3.45) for $D_{\mathrm{m}}(U)$ as well as the resulting estimate for a.

3.6.3 Full Phase Diagram

So far, we have in this section derived a differential equation for the thermodynamic first-order transition line $U_{\mathrm{c}}(T)$, i.e., $\mathrm{d}U_{\mathrm{c}}(T)/\mathrm{d}T = f(T, U)$, seen that a linear