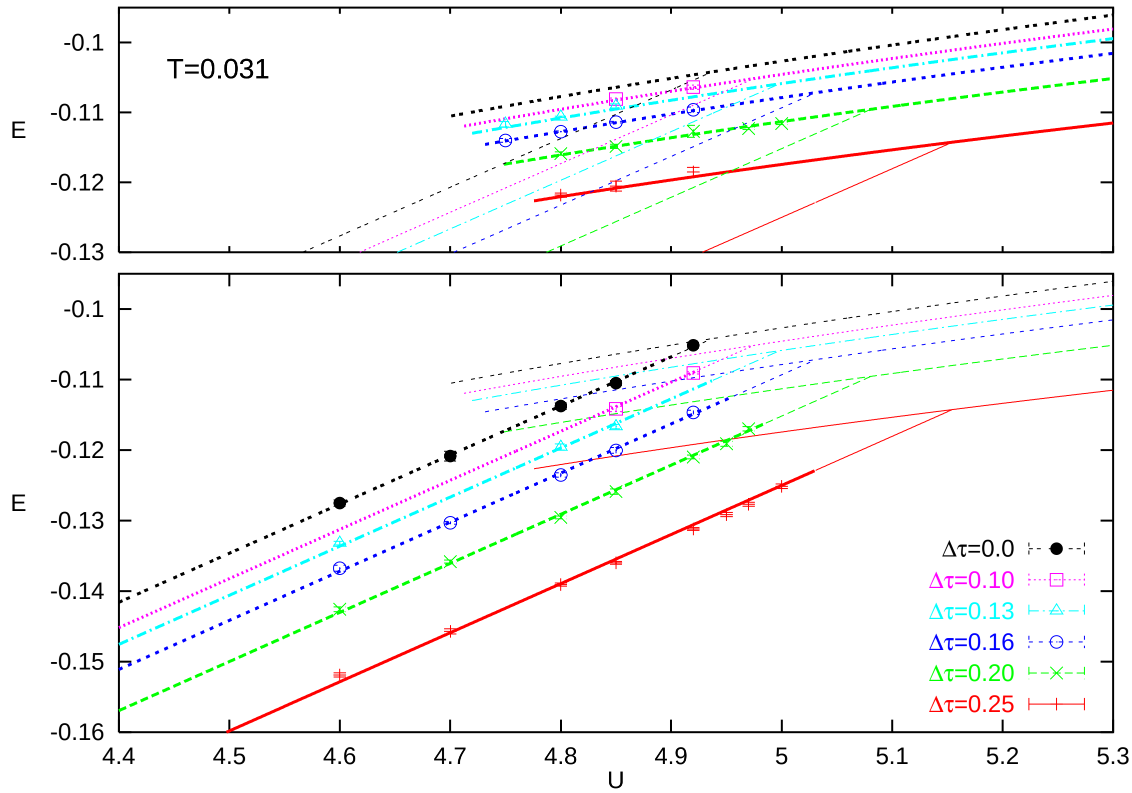

Figure 3.26: Total energy for $T = 1/32$, analogous to Fig. 3.24. The QMC data, here with increased precision near the edges of the coexistence region, is in very good agreement with the fit curves.

where metallic or insulating solutions were found to be unstable (not shown) was not only used for determining the stability edges for this temperature, but also for establishing the extrapolation laws (for $\Delta\tau \to 0$) for the other temperatures.

Note that the metal remains stable and closely follows the assumed linear dependence of U until its energy almost reaches the energy of the insulating solution at U_{c2}. The solutions are very different energetically, however, when the insulator becomes unstable at U_{c1}. Qualitatively, the same behavior is also demonstrated for $T = 0.025$ in Fig. 3.27 and for $T = 0.02$ in Fig. 3.28. As we will see in subsection 3.5.5, the double occupancy of the metal also approaches that of the insulator near U_{c2}. Such behavior is not generically expected for first-order transitions: since the order parameter is necessarily different between coexistent solutions even at the stability edge of one solution, most properties (not directly related to the free energy) will usually also be quite different. On the other hand, the observed behavior is clearly compatible with a Landau theory as has been illustrated in Fig. 3.4b. More light can be shed on the observed behavior by considering the qualitative physics of the $d = \infty$ Hubbard model near the MIT. Since the formation of quasiparticles lowers the total energy and since the space of solutions in the homogeneous phase may be regarded