$U = 4.6$ may be exaggerated due to the finite frequency grid $\Delta\omega = 0.1$ (which is here already of the same order of magnitude as the width of the quasiparticle peak). The clearly reduced peak hight at $U = 4.7$, however, marks the destruction of the Fermi liquid. For this value of the interaction, an additional shoulder or peak appears in each Hubbard band. As seen from the integrated spectral weights shown in the insets of Fig. 3.77 and Fig. 3.78, the main difference between the spectra for $U = 4.6$ and $U = 4.7$ is a shift of spectral weight of about 0.05 from $|\omega| \lesssim 0.5$ to $|\omega| \gtrsim 0.5$.

The spectra corresponding to the insulating phase at $U = 4.7$ shown in Fig. 3.79 and Fig. 3.80 do not follow the expected form. In fact, the remnant of a quasiparticle peak points to a more metallic character. Since $U = 4.7$ is right at the edge of the stability region for $T = 0.05$ and $\Delta\tau = 0.1$ as previously seen in Fig. 3.24, this fact may be due to numerical errors (although the corresponding QMC solution has been found to be stable for some 20 iterations). Such ambiguities are absent for $U \geq 4.8$: a pseudogap with very low residual spectral weight appears for $U = 4.8$. Within the numerical accuracy, the spectrum for $U = 5.0$ is already gapped with a gap size of about 0.5 which is in line with the estimate obtained in Fig. 3.70. The gap size increases to about 1.2 for $U = 5.5$. A shoulder or two-peak structure of the Hubbard band is seen in all results for the highly correlated metallic phase and for the insulating phase which supports the genuineness of this feature. It does not become more pronounced with increasing interaction (in the insulating phase), but is slightly reduced from $U = 5.0$ to $U = 5.5$. Such a behavior is expected since rigid semi-elliptic Hubbard bands (of widths W and centered around $\omega = \pm U/2$) have to be recovered for $U \to \infty$ (Gebhard, 1997).

Results for $T = 0.067$, i.e., above the critical temperature, are shown in Fig. 3.81 for the more metallic phase and in Fig. 3.82 for the more insulating phase. We caution the reader that these results have not been checked as carefully as the preceding results (for $T = 0.05$). We still expect the following observations to be genuine. It is seen in Fig. 3.81 that the height of the quasiparticle peak decreases significantly with increasing U already for $4.0 \lesssim U \lesssim 4.5$. Thus, the Fermi liquid phase breaks down before the crossover towards the insulator (defined in terms of the energy dependence; cf. Fig. 3.23) takes place at $U \approx 4.62$. Again, the appearance of a second peak in the Hubbard band is associated with the disappearance of the quasiparticle peak, here for $U = 4.6$. On the insulating side, the gap opens very slowly; significant spectral weight is still present at $|\omega| \approx 0$ for $U = 4.7$ and $U = 4.8$. Deep inside the insulating phase at $U = 5.0$ and $U = 5.5$, however, the spectra are quite similar to the spectra computed for $T = 0.05$ with gap sizes of about 0.5 and 1.2, respectively. The temperature independence of the spectra in the insulating phase is in line with the corresponding observation of such independence made for the energy and the double occupancy in subsection 3.5.2.

Finally, let us compare the spectra computed within this thesis with previously published work. Fig. 3.83 a reproduces spectra for $T = 0.05$ computed by Jarrell and included in our joint publication (Schlipf et al., 1999). Considering the slight difference in the imaginary-time discretization used by Jarrell ($\Delta\tau = 0.167$ versus $\Delta\tau = 0.1$ for our results), the overall agreement is reasonable. The better agreement with Luttinger's theorem for $U = 4.0$ may be due to the finer frequency grid used by