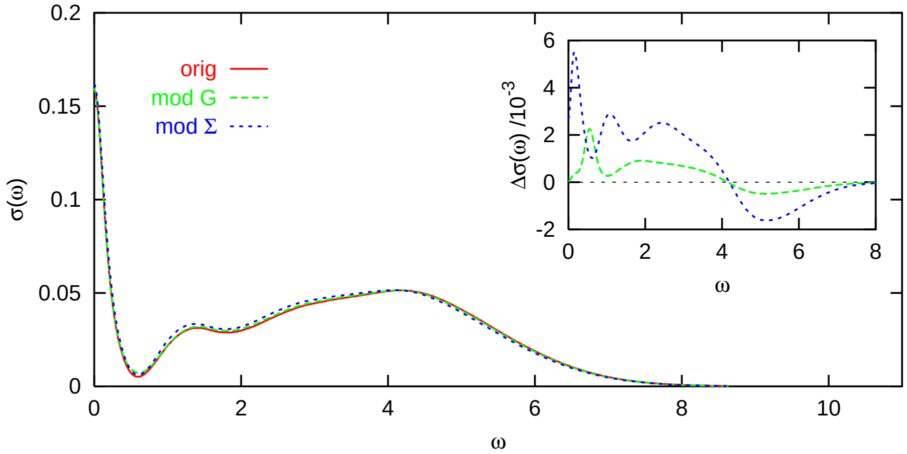

Figure 4.33: Optical conductivity for the isotropic "redefined Bethe lattice" for $T = 0.05$ and $U = 4.7$: The slight modifications in $\operatorname{Im}\Sigma(\omega)$ shown in the inset of Fig. 4.32 lead to almost indistinguishable results for $\sigma(\omega)$; the inset gives a magnified view of the differences.

to U^2 by dimensional analysis. This assumption is indeed correct as can be shown by evaluating the equations of motion of the impurity model (Potthoff, Wegner, and Nolting, 1997); in the case of interest, the norm reads $\int_{-\infty}^{\infty} d\omega A_\Sigma(\omega) = U^2/4$ (solid line in Fig. 4.32).[52] Considering the numerous potential sources of errors entering the sum rule (such as Trotter and statistical errors, incomplete convergence and the MEM procedure) the deviations of typically 2% of our numerical results from the exact values appear small; the good agreement lends further credibility to these results.

Furthermore, we can estimate if the total weight of the peaks in $\operatorname{Im}\Sigma(\omega)$ for $U = 4.7$ (dash-dotted lines in Fig. 4.30 b) is too large: Since the total numerical norm is relatively higher (though closer to the exact value) for $U = 4.7$ than for other values of U, one might suspect that the extra weight is due to a numerical error and should be corrected. In order to investigate this question and in particular the possible impact on the resulting estimate for $\sigma(\omega)$, we have generated two adjusted estimates for $\Sigma(\omega)$ shown in the inset of Fig. 4.32. In the first case (short-dashed line), the peak height in the original estimate for $\operatorname{Im}\Sigma(\omega)$ (long-dashed line) has been reduced so that the total is in line with the norms obtained for other values of U (cross in the main panel). Alternatively, the MEM spectrum has been adjusted slightly so that it lead to a softer peak in $\operatorname{Im}\Sigma(\omega)$ (dotted line in the inset). The resulting three different estimates for $\Sigma(\omega)$, however, yield almost indistinguishable conductivities as depicted in Fig. 4.33. Thus, at least the most prominent uncertainty for $\Sigma(\omega)$ for $U = 4.7$ is qualitatively irrelevant for the results to be presented in the remainder of this section.

[52] This sum rule which (to the best of our knowledge) has not been mentioned in the DMFT-QMC community so far can also be directly applied on the imaginary axis in the context of QMC calculations. For its use in an improved Fourier scheme and its generalization to arbitrary filling and to the multi-band case, see App. C and Knecht (2002).