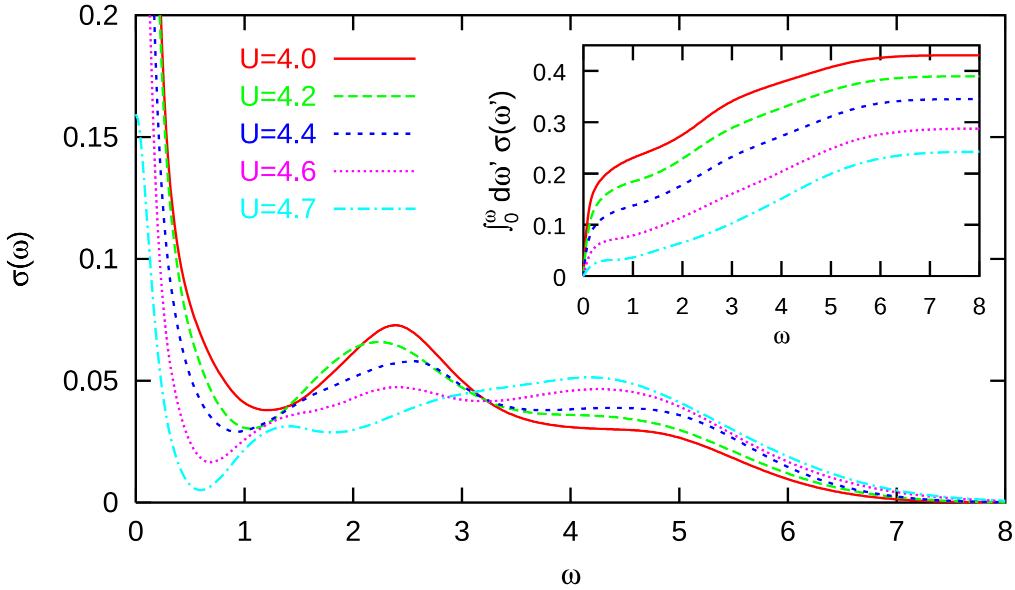

Figure 4.34: Optical conductivity $\sigma(\omega)$ for the isotropic "redefined Bethe lattice" at $T = 0.05$ in the metallic phase. With increasing U, weight is shifted from a Drude peak at $\omega \approx 0$ to a mid-infrared peak/shoulder at $\omega \approx U/2$ and, finally, to a broad incoherent peak at $\omega \approx U$. The inset shows the partial f-sum $\int_0^\omega d\omega' \sigma(\omega')$ which saturates for $\omega \approx 8$.

4.6.3 Results: Optical Conductivity

This subsection comprises the main numerical results of this chapter. Using the procedures detailed in the previous subsection, we will here present results in the paramagnetic low-temperature phase near the Mott metal-insulator transition. The optical conductivity data will in turn be shown for three different definitions, i.e., different models compatible with a semi-elliptic DOS: first, the isotropic "redefined Bethe lattice" specified in Sec. 2.4 (using the general dispersion approach developed in Sec. 2.3), then the (anisotropic) stacked Bethe lattice, and, finally, the incoherent definition which corresponds to a disordered model or to a single-chain layout of the Bethe lattice. The numerical results for the first two cases will be based on the self-energies $\Sigma(\omega)$ shown in Fig. 4.30 and Fig. 4.31. An estimate of the self-energy is not needed in the last, incoherent case; here, the optical conductivity will be computed directly from the MEM spectra $A(\omega)$ shown in Fig. 3.77 and Fig. 3.79. In all cases, the constants e, $\hbar$, and the lattice spacing a are set to unity which corresponds to setting $\sigma_0 = 2\pi$ [for the coherent case; cf. (4.67)].

Coherent Transport

We start the presentation of optical conductivity data with the redefined Bethe lattice; for this model, $\tilde{\rho}(\omega)$ has the exact analytic expression (4.133). Figure 4.34 displays results for the metallic phase near the MIT. Each curve features a prominent "Drude" peak at low frequencies which is associated with excitations within