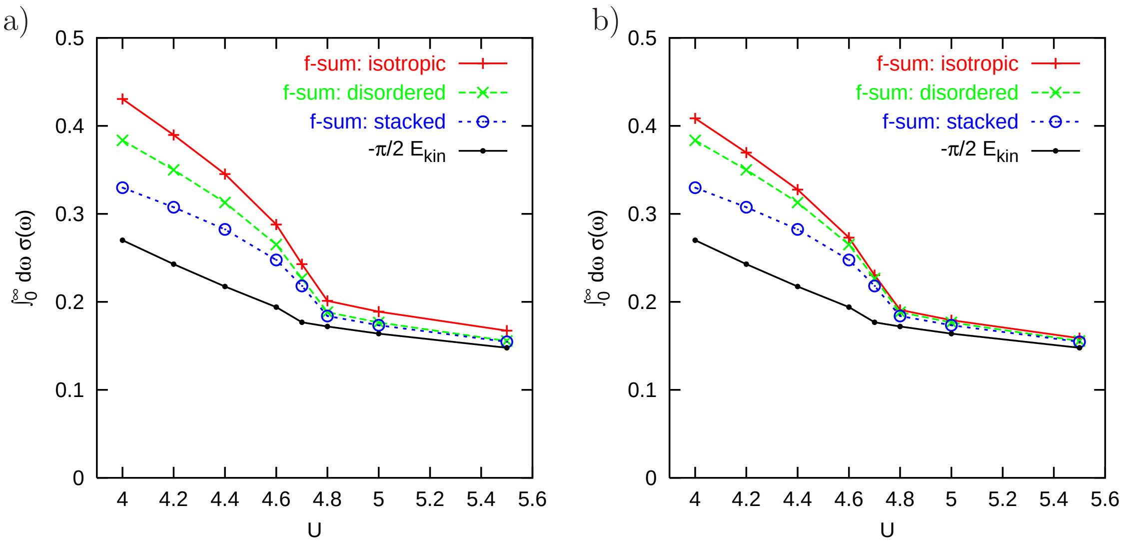

Figure 4.44: Optical f-sum for models with semi-elliptic DOS, computed by numerical integration of the results for $\sigma(\omega)$ shown in Fig. 4.34 – Fig. 4.42: **a)** scaled to unit a and unit variance of the DOS, **b)** rescaled to unit average hopping distance (division of the f-sum of the isotropic model by 1.05406).

limit $U \to 0$ and $T \to 0$ where only states near the Fermi surface can contribute to transport. Averaged over the whole Brillouin zone, the enhancement is only (in general) $\int_{-\infty}^{\infty} d\epsilon\, \tilde{\rho}(\epsilon)$ which equals the average hopping distance $\sum_{D=1}^{\infty} D {t_D^*}^2$; using the values for the hopping amplitudes given in Table 2.1, it evaluates here to 1.05406. A corresponding increase in the f-sum in the limits $T \to \infty$ and/or $U \to \infty$ can be read off from the form (4.86) of the f-sum rule since in these cases the derivative of the momentum distribution function becomes asymptotically constant (as a function of ϵ). This asymptotic behavior is already well approached for $U = 5.5$ as seen in Fig. 4.45 b. If the asymptotic enhancement is removed by scaling the average hopping distance to unity (Fig. 4.44 b), the f-sums of the isotropic and of the stacked model (as well as of the disordered model) are nearly identical.

In Fig. 4.46, partial contributions to the f-sum rule are displayed as a function of momentum ϵ so that the f-sums shown above would be obtained by integration over ϵ. The picture differs considerably depending on whether the sum rule is used in terms of the momentum distribution function n_ϵ as in Fig. 4.46 a or in terms of its derivative as in Fig. 4.46 b . In both cases, however, the isotropic model (thick lines) implies contributions to $\sigma(\omega)$ which arise from smaller values of $|\epsilon|$ than the stacked model (thin lines). This is true in particular for the metallic phase at $U = 4.0$; transport is here dominated by states near the Fermi surface. Such behavior is not only consistent with Fermi-liquid theory, but also most compatible with the DMFT approach: nongeneric momenta with extremal $|\epsilon|$ should not influence results of DMFT calculations.