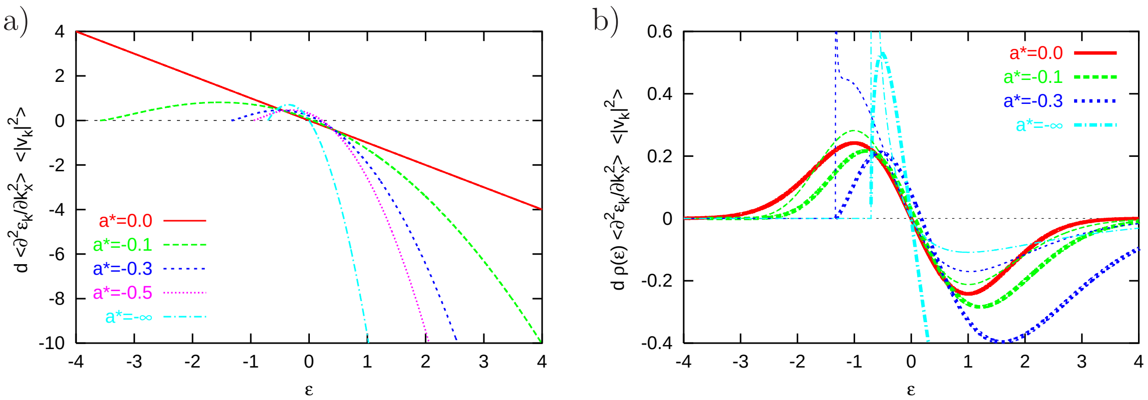

Figure 4.25: DMFT transport characteristics of the $t-t'$ lattice: Lattice-dependent terms entering the expression (4.140) for the transverse conductivity. **a)** Intermediate result: $d\langle\frac{\partial^2\epsilon_{\boldsymbol{k}}}{\partial k_x^2}\rangle(\epsilon) = \tilde{\rho}'(\epsilon)/\rho(\epsilon)$ multiplied by $\langle|v_{\boldsymbol{k}}|^2\rangle(\epsilon) = \tilde{\rho}(\epsilon)/\rho(\epsilon)$. **b)** Multiplication by the DOS $\rho(\epsilon)$ yields the correct lattice dependence (thick lines). Thin lines: corresponding results of an (unjustified) application of expressions valid for the pure hc lattice as used by Merino and McKenzie (2000). The limit $a^* = -\infty$ is equivalent to the fcc lattice.

the effective second derivative can be derived to read (for $a^* \leq 0$)

$$d\langle\frac{\partial^2\epsilon_{\boldsymbol{k}}}{\partial k_x^2}\rangle(\epsilon, a^*) = \frac{h^+(\epsilon, a^*)\rho^+(\epsilon, a^*) + h^-(\epsilon, a^*)\rho^-(\epsilon, a^*)}{\rho(\epsilon, a^*)} \,. \tag{4.151}$$

Evaluations of these expressions for moderate frustration are shown in Fig. 4.25 a. Note the strong deviations compared to the hc result (straight solid line). Figure 4.25 b depicts expectation values multiplied by the noninteracting DOS as they enter the computation of the transverse conductivity. Clearly, the correct curves (thick lines) bear little resemblance to an evaluation of the hc results for the $t-t'$ DOS (thin lines). Consequently, the study by Merino and McKenzie (2000) should be redone using the results presented in this subsection.

4.6 QMC Results for the Bethe Lattice

In this section, we discuss important practical aspects for numerical DMFT calculations of the optical conductivity $\sigma(\omega)$ and present results for the half-filled one-band Hubbard model with semi-elliptic DOS near the metal-insulator transition. Building upon the framework developed in Sec. 4.4, we do not only present conductivity data for the stacked Bethe lattice considered previously in the literature, but also for the new isotropic model with longer-range hopping and for the fully disordered model. While it is clear a priori that all results corresponding to the same local spectra share some common features, the differences will be seen to be significant, in particular in the metallic phase. Properties like the Hall conductance and the thermopower, which we discussed in the previous section, need not be computed since they vanish identically for the particle-hole symmetric systems under consideration.