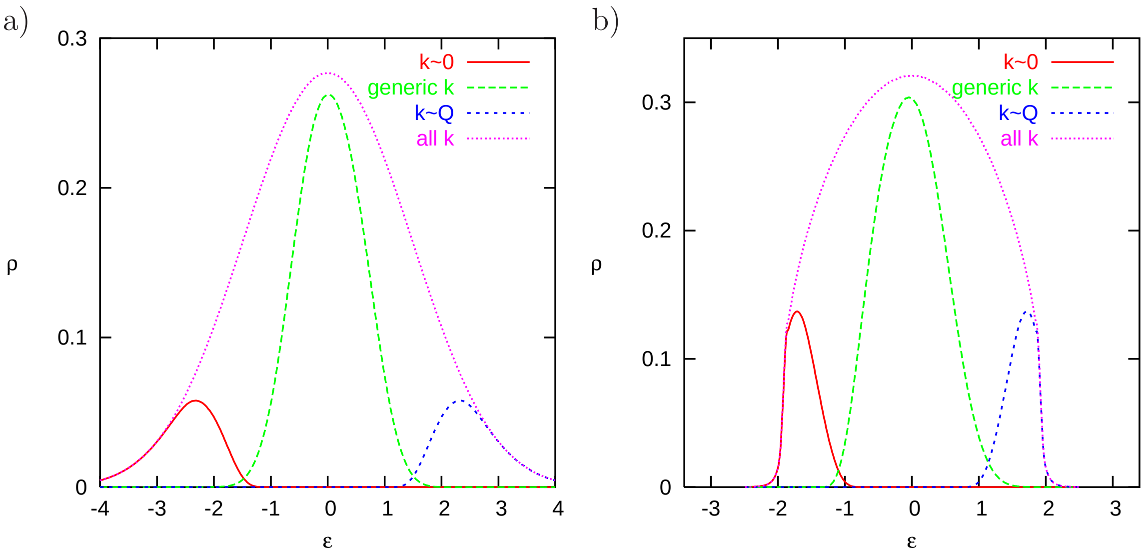

Figure 2.22: Partial DOSs **a)** of the hc lattice and **b)** of the 5^{th} order truncation of the redefined Bethe lattice in $d = 10$ (solid and dashed lines) in comparison with the full DOSs (dotted lines). The restriction to momenta with $|\boldsymbol{k}| \approx 0$, $|\boldsymbol{k}| \approx \langle|\boldsymbol{k}|\rangle$, and $|\boldsymbol{k} - \boldsymbol{Q}| \approx 0$ is explained in the text.

be regarded as a minimal modification of the NN-hopping hc lattice for which the DOS becomes semi-elliptic.

2.4.4 Application to Asymmetric Model DOS

It should be evident that our method is by no means restricted to the Bethe DOS or to a symmetric DOS in general. In fact, it gives a natural description for all nonsingular single-band DOSs. In order to illustrate the application to an asymmetric case, to draw a connection to earlier work (Wahle et al., 1998), and to compare with estimates for hopping amplitudes obtained within an alternative scheme (Kollar, 1998), we also applied our formalism to the asymmetric model DOS (2.27) which contains the asymmetry parameter $-1 \leq a \leq 1$ and coincides with the semi-elliptic Bethe DOS for $a = 0$.

As seen in Table 2.2, slight asymmetry ($a = 0.5$) leaves the scaled hopping matrix elements corresponding to odd hopping range $D = 2n + 1$ almost invariant while the even range hopping becomes relevant. The energy shift (i.e., finite first moment) implicit in (2.27) for $|a| > 0$ gives rise to a finite on-site amplitude t_0^2 which can be evaluated using (2.55) for $D = 0$ just like for finite hopping range $D > 0$. With increasing asymmetry ($a = 0.9$ and $a = 0.98$, cf. Fig. 2.13), the even range hopping elements become more dominant and also the decay is slower than for the symmetric Bethe DOS. Even an asymmetry ($a = 0.98$) strong enough to allow for ferromagnetism in the pure Hubbard model (Wahle et al., 1998) thus naturally fits into the present scheme. However, an application of the method (with a monotonic transformation function) would be questionable for the singular case $a = 1$, which