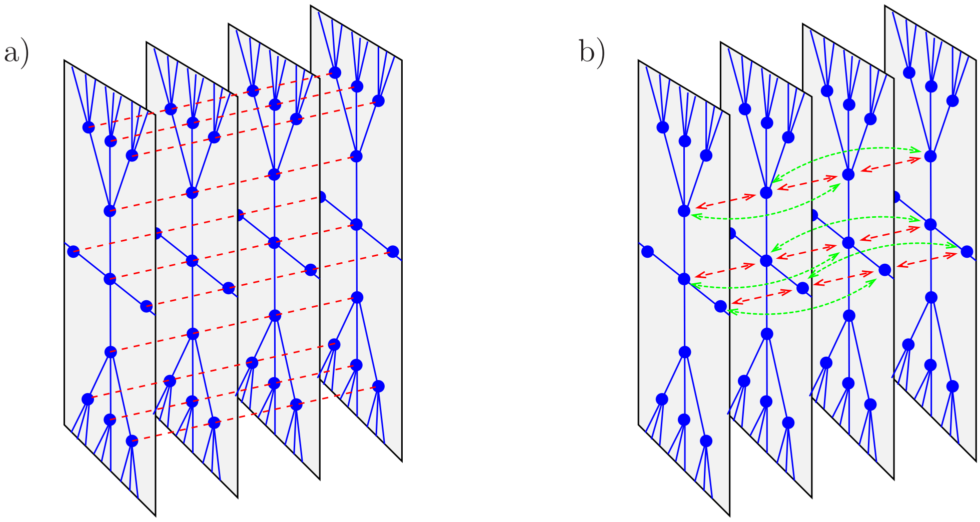

Figure 4.12: Stacked lattices with **a)** NN hopping in stacking direction and **b)** simultaneous NN and NNN hopping, here shown for Bethe lattice hyperplanes with $Z = 4$. For clarity, only a selection of bonds is shown in b).

or pseudolattice, it is important to note that it in general describes anisotropic ("c-axis") transport. The basic idea of the approach is that the influence of adding a finite number of additional hopping bonds per site on the kinetic energy and on all other local properties will scale to zero in the limit $Z \to \infty$. Thus, the unperturbed Hamiltonian (i.e., without coupling to external fields) can be changed in order to make the transport problem well-defined (or to redefine it), while leaving the local DMFT problem unchanged.

The additional bonds are defined by extending the vector space in which the original lattice lives[40] by one extra dimension. Copies of the hyperplane (i.e., the original vector space) can then be stacked along the new dimension, connecting sites with the same intraplanar coordinates by hopping bonds. We will in the following assume that the additional hopping matrix elements scale like $1/\sqrt{Z}$ so that their contribution to the variance of the total kinetic energy is $\mathcal{O}(1/Z)$.[41] This construction is illustrated in Fig. 4.12 a for nearest-neighbor hopping in current direction x. Obviously, the resulting lattice is periodic (at least) in this direction. Furthermore, all lattice sites remain fully equivalent.[42] Therefore, the component k_x of the wave vector is well-defined which makes the general results of the beginning of this section

[40]Since the Bethe lattice is a planar graph, it can be arranged in 2 dimensions. Within the present approach, the particular layout within the plane and even the embedding dimension are irrelevant.

[41]While this assumption is most natural in the DMFT sense it suffices for the theory to apply that the additional terms decay for $Z \to \infty$. In fact, there is no compelling reason in this anisotropic case that hopping terms in the anisotropy direction should have the same scaling law $\propto 1/Z$ as those within the hyperplanes.

[42]Note the contrast to the alternative approaches discussed in subsection 4.4.1 and subsection 4.4.2 where the equivalence of lattice sites was broken by the assignment of level numbers to sites or by the selection of current carrying bonds, respectively.