when hopping to 7^{th} or 9^{th} nearest neighbors is included. For the full model, the average squared hopping distance is 1.054, i.e., surprisingly close to the value 1 valid for the usual hypercubic lattice. The convergence of the method (with the number of nonzero hopping matrix elements and with dimensionality) is similarly good in terms of the distribution of spectral weight for other sufficiently smooth target DOSs. The fact that exactly vanishing even-range hopping matrix elements are predicted for any symmetric DOS follows necessarily for any consistent approach and is not specific to our method.

With the general dispersion method developed in Sec. 2.3, we have singled out one route to high dimensions with a series of very favorable properties (specializing on the case of a monotonic transformation function): (i) The approach does not require large long-range hopping amplitudes. (ii) Generically, the DOSs corresponding to finite-d versions of the computed tight-binding model depend only weakly on dimensionality. (iii) The topology of the Fermi surface remains hypercubic-like at all fillings in arbitrary dimensions with the energy minimum of $\epsilon_{\boldsymbol{k}}$ at $\boldsymbol{k} = \boldsymbol{0}$ (and the maximum at $\boldsymbol{k} = \boldsymbol{Q}$). (iv) The full hypercubic symmetry is retained. (v) For the first time, transport properties for the Bethe DOS can be calculated in a fully consistent way (including an f-sum rule) without resorting to anisotropic models. (vi) The derived equations can be used as a heuristic approach for transport calculations in finite dimensions when only the DOS is known (e.g., from LDA calculations).