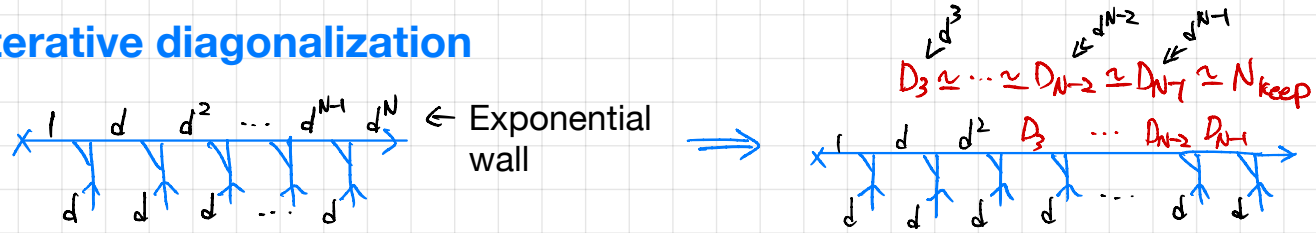
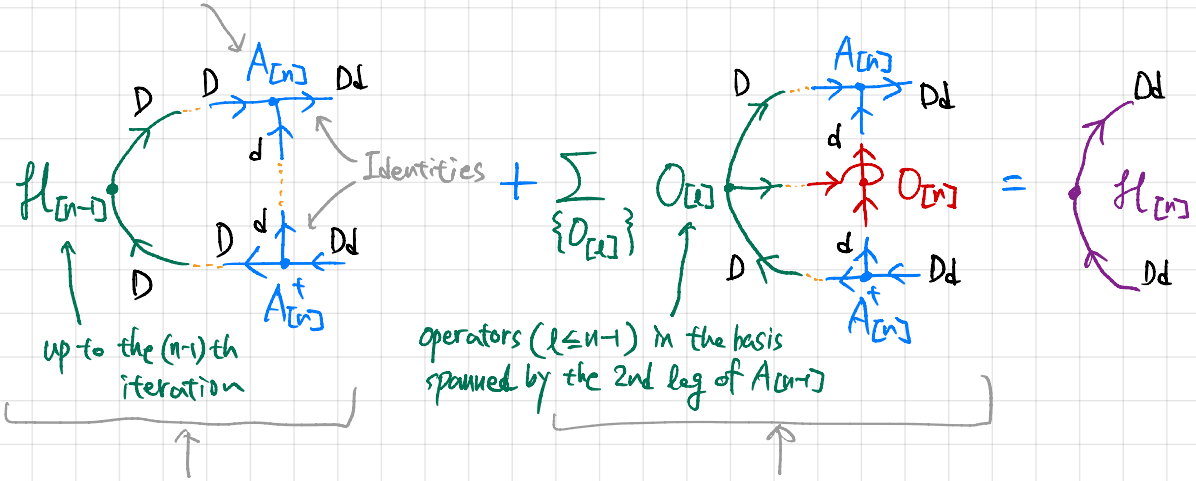
Iterative diagonalization



At each iteration of computing matrix elements of the Hamiltonian ("along the zipper"):

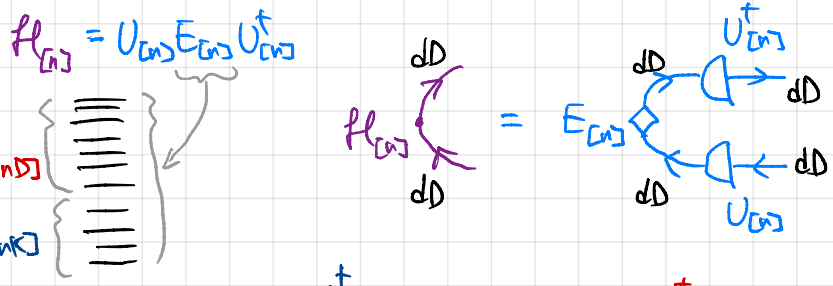
(1) Define the identity tensor



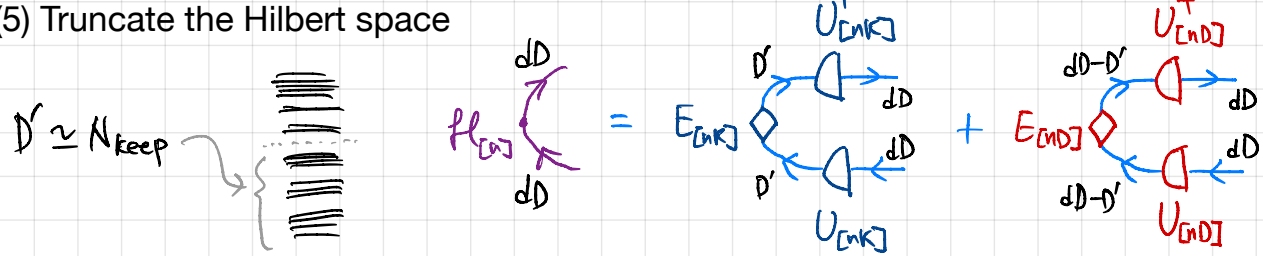
(2) Expand the Hamiltonian in the new basis for the n-th iteration

(3) Add terms (e.g., particle hopping, spin-spin interaction)

(4) Diagonalize the Hamiltonian

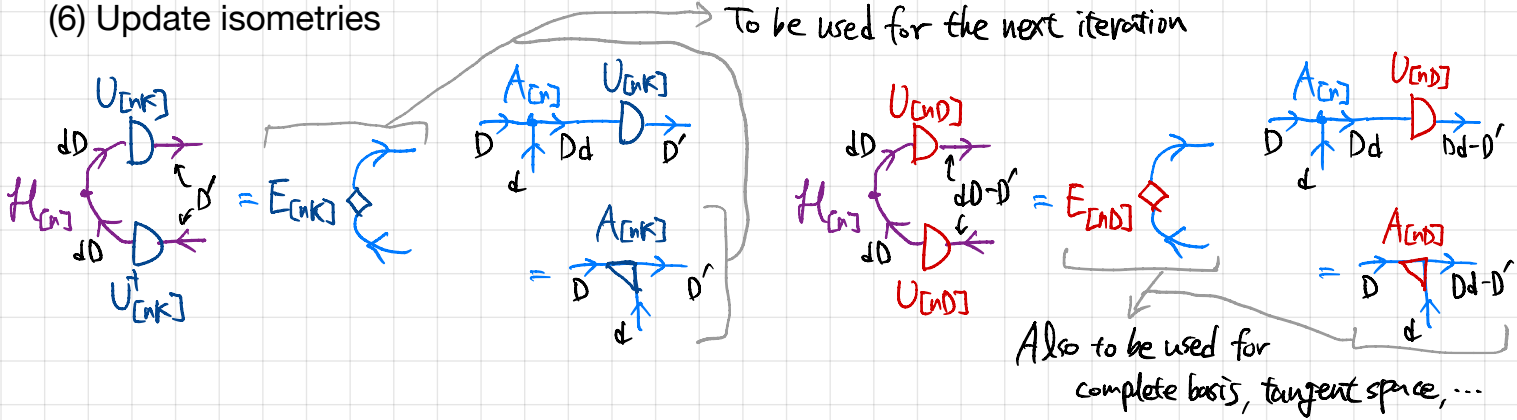


(5) Truncate the Hilbert space

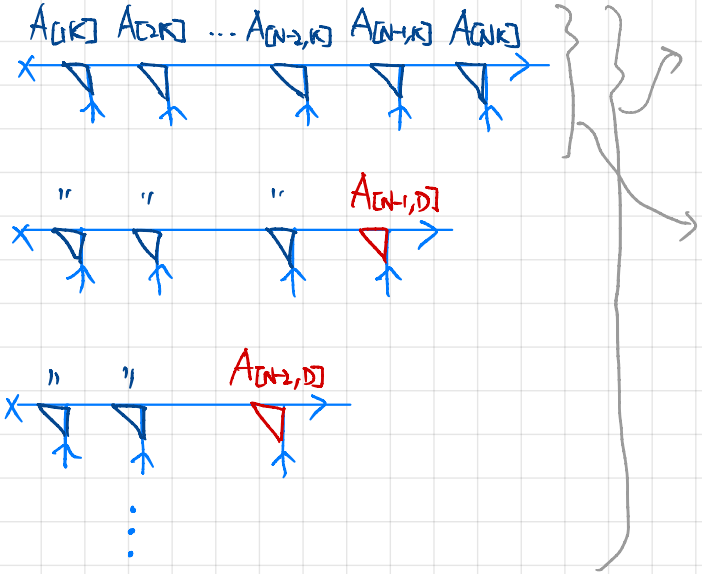


Note: Keep degenerate states (e.g., belonging to the same symmetry multiplet) together (or discard them together), not to artificially break the symmetry of the system

(6) Update isometries



Result:



For constructing the complete basis of energy eigenstates in the numerical renormalization group (NRG)

Initialization of the variational ground-state search in the density-matrix renormalization group (DMRG)