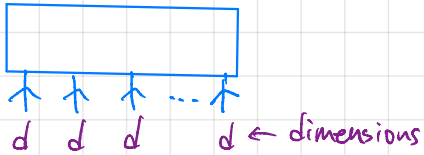
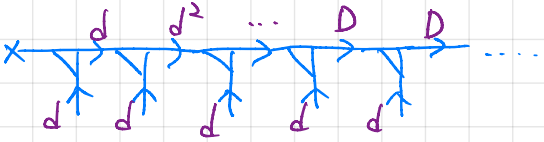
Area law of entanglement

Tensor networks as efficient representation of many-body states:

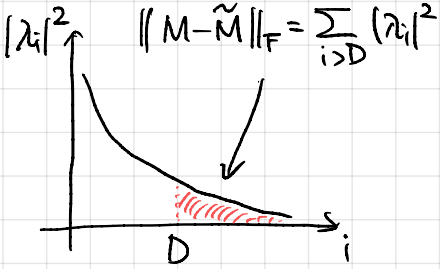




# of elements = d^N $\gg$ # of elements = $O(ND^2d)$

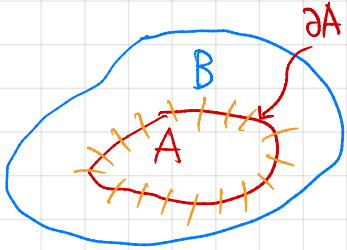
$$\tilde{M} = \sum_{i=1}^{D} \vec{u}_i \lambda_i \vec{v}_i^{\dagger}$$

truncation error = discarded weight:



bond entanglement $\leq \log_2 D$

How can we use finite bond dimensions?: area law



Entanglement entropy between A & B $\propto$ area of ∂A

- 1D gapped: $\sim$ const.
- 1D gapless: $\sim$ const + log L
- 2D gapped: $\sim L$
- 3D gapped: $\sim L^2$