

## Problem Set 7

### Exercise: Tensor renormalization group

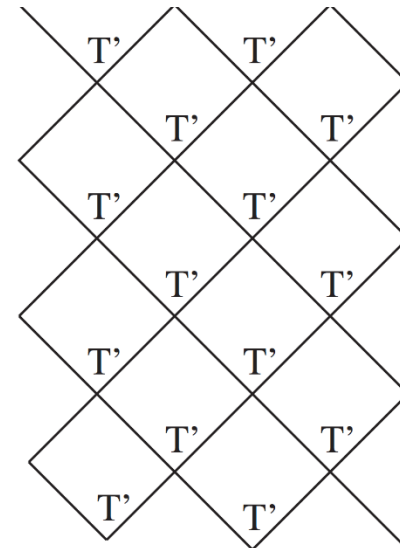
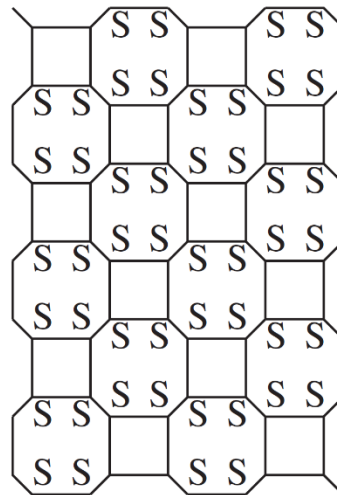
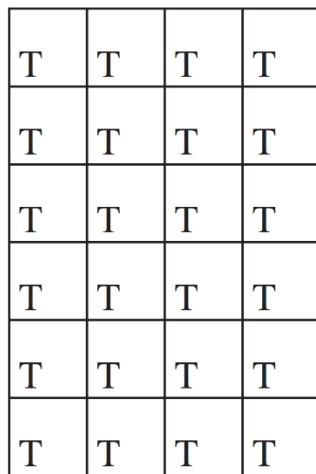
- Consider the partition function of the square-lattice Ising model:

$$Z = \sum_{\{\sigma\}} e^{-\beta H(\{\sigma\})} \quad H(\{\sigma\}) = - \sum_{\langle ij \rangle} \sigma_i \sigma_j$$

- Construct a tensor network representation of the partition function.



- Implement the TRG algorithm on the square lattice and compute the partition function of the Ising model.



SS2021: Tensor Networks

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- **Bonus:** You are encouraged to calculate the partition function also by using the MPO-MPS evolution. If this is done, you may compare with the TRG results.