Quantum Information and Computing
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The authors of the paper https://www.nature.com/articles/s41534-020-00352-4 develop an extension of the DMRG algorithm, the so-called multi-targeted DMRG algorithm, that allows the computation of several excitations simultaneously.

1) With the help of https://arxiv.org/abs/1911.11566, understand the method and its application to the case of the Hamiltonian of the fluxonium qubit;
2) Using tensor network libraries for basic tensor manipulations, implement the multi-targeted DMRG algorithm and apply it to find the excitations of Eq. 3 to reproduce Fig. 2(a).
3) (Optional) Use exact diagonalization to solve the spectrum of the effective model in Eq.4 and see how it compares to the previous result.

By the due date please submit both the code and the presentation of the final project. The presentation must cover the topics detailed above, including the theory part. There is no limit to the number of slides however, the final presentation should last 15+15 minutes.