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Dualities among scar states

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In this work we consider a particular class of Hamiltonians, known as stochastic matrix form (SMF) Hamiltonians, for which there is a systematic understanding of how to construct exact quantum many body scar (QMBS) states at zero energy. We study a particular example of a one-dimensional SMF Hamiltonian, for which there are QMBS subspaces that are connected through a Krammers-Wannier duality, implemented by a sequential quantum circuit (SQC). We argue, through a numerical analysis, that QMBS states connected by the action of the Krammers-Wannier SQC are more robust than those states that do not have a dual counterpart. We further show, that due to these unexpected properties, first order perturbation theory can be used as a good approximation to the exact results.

Primary author: FONTANA, Weslei (NTHU)

Presenter: FONTANA, Weslei (NTHU)

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