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Microscopic hadronic quark physics for existing and near-term quantum computer devices

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Given any effective Hamiltonian possessing the mechanism of spontaneous chiral symmetry it can be mapped to an equivalent problem of several interacting spins, by means of a Bravyi-Kitaev transformation. Jordan-Wigner transformations are also discussed.

The resulting Hamiltonian is on a suitable form to be implemented on a digital quantum computer, where spins are mapped into qubits. We propose a systematic method to determine the mass spectrum of quark-antiquark bound states, and compute it to its simplest form . Some exploratory runs have been made using the IBM quantum computer.

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