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Quantum emulation of molecular force fields: A blueprint for a superconducting architecture[1] DIEGO G. OLIVARES, Instituto de Fsica Fundamental IFF-CSIC, BORJA PEROPADRE, Quantum Information Processing group, Raytheon BBN Technologies, JOONSUK HUH, Mueunjae Institute for Chemistry, Department of Chemistry, Pohang University of Science and Technology (POSTECH), JUAN JOS GARCA-RIPOLL, Instituto de Fisica Fundamental IFF-CSIC — We propose a flexible architecture of microwave resonators with tuneable couplings to perform quantum simulations of molecular chemistry problems. The architecture builds on the experience of the D-Wave design, working with nearly harmonic circuits instead of with qubits. This architecture, or modifications of it, can be used to emulate molecular processes such as vibronic transitions. Furthermore, we discuss several aspects of these emulations, such as dynamical ranges of the physical parameters, quenching times necessary for diabaticity and finally the possibility of implementing anharmonic corrections to the force fields by exploiting certain nonlinear features of superconducting devices.

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