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Quantum simulation of spin-bath dynamics with trapped ions DYLAN GORMAN, ELI MEGIDISH, BORGE HEMMERLING, HARTMUT HAEFFNER, Univ of California - Berkeley — Chains of trapped ions are an ideal platform for studying the dynamics of qubits coupled to bosonic environments. This kind of dynamics is of interest in many current problems in physics and biology such as charge transport, photosynthesis, and olfaction. In a chain of N trapped ions, an experimenter has access to an environment of the 3N vibrational modes of the chain, allowing for the simulation of very large vibrational environments with tunable spectral properties. In addition, the ions also serve as qubits, and both qubit-qubit and qubit-bath interactions can be engineered via quantum gates. Here, we discuss recent experimental progress investigating spin-bath dynamics in ion strings. We explore what happens as the spin-bath coupling is varied, as well as when the thermal occupation and quantum state of the environment is varied.

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