

Abstract Submitted
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Quantum manipulation and simulation using Josephson junction arrays XINGXIANG ZHOU, ARI MIZEL, The Pennsylvania State University — We discuss the prospect of using quantum properties of large scale Josephson junction arrays for quantum manipulation and simulation. We study the collective vibrational quantum modes of a Josephson junction array and show that they provide a natural and practical method for realizing a high quality cavity for superconducting qubit based QED. We further demonstrate that by using Josephson junction arrays we can simulate a family of problems concerning spinless electron-phonon and electron-electron interactions. These protocols require no or few controls over the Josephson junction array and are thus relatively easy to realize given currently available technology.

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