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Topological phase transition in a tunable one-dimension chain of superconducting transmission line resonators XIUHAO DENG, University of California, Merced, CHUNJING JIA, Stanford University/SLAC — We designed a simulator of Bose-Hubbard model based on tunable superconducting chain to realize the phase transition to topological Mott-Insulator(TMI). It is formed of transmission line resonators(TLR) with tunable eigen-energy coupled with superconducting quantum interference device(SQUID). This chain can be fabricated into a loop structure so that periodic boundary condition can be applied. In this way, an equivalent superlattice chain arises by adjusting different TLR eigen-energies and coupling energies between them. Phase transition can be realized due to the tunability in superconducting circuit. Benefiting from the tunability and the loop structure, exact diagonalization technique can be implemented in the numerical solution in order to obtain the phase diagram. Also, different kinds of superlattice structures can be engineered to broaden the study of criticality. There are some interesting critical phenomenons in the phase diagrams worth of further discussion.

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