Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Using Superconducting Qubit Circuits to Engineer Exotic Lattice Systems DIMITRIS TSOMOKOS[1], Royal Holloway University of London, SAHEL ASHHAB[2], FRANCO NORI[3], Institute of Physical and Chemical Research (RIKEN) Japan and Physics Department, University of Michigan — We propose an architecture based on superconducting qubits and resonators for the implementation of a variety of exotic lattice systems, such as spin and Hubbard models in higher or fractal dimensions and higher-genus topologies. Spin systems are realized naturally using qubits, while superconducting resonators can be used for the realization of Bose-Hubbard models. Fundamental requirements for these designs, such as controllable interactions between arbitrary qubit pairs, have recently been implemented in the laboratory, rendering our proposals feasible with current technology.

[1]Member of Institute of Physics, UK
[2]APS member
[3]APS member

Dimitris Tsomokos
Royal Holloway University of London

Date submitted: 02 Nov 2010 Electronic form version 1.4