Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Grid-bus surface code architecture SIMON NIGG, Universtity of Basel, ANDREAS FUHRER, IBM research Zurich, DANIEL LOSS, University of Basel — We present a scalable hybrid architecture for the 2D surface code combining superconducting resonators and spin qubits in nanowires with tunable spin-orbit coupling. The back-bone of this architecture is a square lattice of capacitively coupled coplanar waveguide resonators each of which hosts a nanowire spin-orbit qubit. A simple circuit QED model is derived for the coupling between the spin degree of freedom and the quantized resonator modes on the lattice. The electrically tunable qubit frequency allows for fast single qubit phase gates. A two-qubit $\sqrt{i\text{SWAP}}$ gate between neighboring qubits can be realized by a third order process, whereby a virtual photon in one cavity is created by a first qubit, coherently transferred to a neighboring cavity, and absorbed by a second qubit in that cavity. Numerical simulations with realistic parameters predict high gate fidelities.

Simon Nigg
Universtity of Basel

Date submitted: 06 Nov 2016 Electronic form version 1.4