



Contribution ID: 187

Type: **Talk**

[533] Enhancing quantum phase fluctuations in qubits with geometric superinductance

Thursday 2 September 2021 15:30 (30 minutes)

Characteristic impedance in superconducting quantum circuits determines whether the ground state wavefunction is dominated by charge or phase fluctuations. The crossover occurs at $RQ = 6.45 \text{ k}\Omega$ above which the charge fluctuations are suppressed below $2e^-$. Most interesting is the behavior of the Josephson junction (JJ), which acts as a non-linear inductor at low impedance and as a non-linear capacitor in the opposite limit. We explore this limit by shunting the JJ with a geometric inductor formed a superconducting high density planar coil. This element maintains a single uninterrupted wavefunction and offers high reproducibility, linearity and the ability to couple qubits magnetically.

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Session Classification: Quantum Information and Quantum Computing

Track Classification: Quantum Information and Quantum Computing