Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Stochastic methods for driven-dissipative quantum optics GERASIMOS ANGELATOS, HAKAN TURECI, Princeton University — Driven-dissipative non-linear quantum circuits may display dynamics that is difficult to accurately capture using a master equation approach. To keep pace with rapid experimental progress and increasing complexity in superconducting circuit quantum electrodynamics systems, an effective computational approach is needed that is not limited by Hilbert space truncation. We present a stochastic differential equation method to calculate dynamical observables which is based on an exact phase-space representation of the quantum density matrix. This formalism is an extension of our previous work [1] and we present results for the full quantum dynamics of driven cavity-qubit systems for which the semiclassical dynamics does not settle to a steady-state. In this parameter regime, the quantum system under consideration is most sensitive to noise. This stochastic approach elucidates the role of quantum noise in the system dynamics and allows for an intuitive understanding of how it modifies the dynamics of observables.
[1] S. Mandt *et al.*, New J. Phys. **17**, 053018 (2015)

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Date submitted: 11 Nov 2016 Electronic form version 1.4