Superradiance of cold atoms coupled to a superconducting circuit[1] DANIEL BRAUN, University Toulouse, JONATHAN HOFFMAN, Joint Quantum Institute, University of Maryland, EITE TIESINGA, Joint Quantum Institute, NIST — We investigate superradiance of an ensemble of atoms coupled to an integrated superconducting LC-circuit. Particular attention is paid to the effect of inhomogeneous coupling constants. Combining perturbation theory in the inhomogeneity and numerical simulations we show that inhomogeneous coupling constants can significantly affect the superradiant relaxation process. Incomplete relaxation terminating in "dark states" can occur, from which the only escape is through individual spontaneous emission on a much longer time scale. The relaxation dynamics can be significantly accelerated or retarded, depending on the distribution of the coupling constants. On the technical side, we also generalize the previously known propagator of superradiance for identical couplings in the completely symmetric sector to the full exponentially large Hilbert space.

Daniel Braun
University Toulouse