

## Lasing without Inversion in Circuit Quantum Electrodynamics

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We study the photon generation in a transmission line oscillator coupled to a driven qubit in the presence of a dissipative electromagnetic environment. It has been demonstrated previously that a population inversion in the qubit can lead to a lasing state of the oscillator. Here we show that the circuit can also exhibit the effect of “lasing without inversion”. It arises since the coupling to the dissipative environment enhances photon emission as compared to absorption, similar to the recoil effect which was predicted for atomic systems. While the recoil effect is very weak, and so far elusive, the effect described here should be observable with present circuits. We analyze the requirements for the system parameters and environment.