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Electromagnetically-induced transparency combined with lasing without inversion in superconducting qubits JEROME BOURASSA, Universte de Sherbrooke, JAEWOO JOO, University of Calgary, ALEXANDRE BLAIS, Universite de Sherbrooke, BARRY SANDERS, University of Calgary — By strongly driving a transition of a three-level atom one dresses the atomic states with the external field resulting in an Autler-Townes energy level splitting. The absorption and dispersion properties of the medium can then be controlled optically in order to realize effects such as electromagnetically-induced transparency (EIT) and lasing without inversion (LWI). In atomic systems, these two effects are however usually not realized together. Away from their symmetry point, both the flux qubit and the fluxonium form a Δ-configuration where transitions between any two of the lowest three states are allowed. When driven by two resonant fields, we show that the system exhibits a transparency frequency window sandwiched between an absorption band (EIT) on one side and an amplification band (LWI) on the other. Finally, we discuss a possible implementation and measurement scheme using the flux qubit or the fluxonium charge qubit.

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