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Collective modes in the fluxonium qubit[1] GIANLUIGI CATELANI, Forschungszentrum Julich PGI-2, GIOVANNI VIOLA, RWTH Aachen - IQI — In the fluxonium qubit, an array comprising a large number of identical Josephson junctions form a so-called superinductance. The superinductance is connected to a junction - the phase slip element - with a smaller Josephson energy and a different charging energy. We investigate the effects of unavoidable capacitive couplings to ground as well as non-linearities of the superinductance: they both introduce interactions between the low-energy qubit degree of freedom and higher-energy collective modes of the circuit. We also consider the role of the additional capacitances that are used to couple the qubit to a resonator for driving and read-out. We show that the interactions with the collective modes can affect not only the spectrum of the qubit but also its coherence.

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Gianluigi Catelani
Forschungszentrum Julich PGI-2

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