



ID de Contribution: 442

Type: Poster

Superconducting weak link in a large inductance circuit

Phase-biased superconducting weak links host Andreev bound states, which are at the origin of the Josephson coupling. The phase biasing is realized by placing the weak link in a low-inductance superconducting loop, threaded by a magnetic flux. Microwave pulses can induce transitions between configurations differing by states occupations, and various kinds of “Andreev qubits” using few-channel weak links have been demonstrated [1-5].

In an opposite limit, when connected to a large enough inductor, the phase fluctuations across a weak link can exceed 2π . We address here the energy spectrum of the resulting circuit, in which Andreev states and electromagnetic circuit modes combine. We discuss how the two lowest energy states define a qubit with intrinsic protection against relaxation and dephasing, for a certain parameters regime.

[1] C. Janvier et al., “Coherent manipulation of Andreev states in superconducting atomic contacts”, *Science* 349, 1199 (2015), arXiv:1509.03961.

[2] M. Hays et al., “Direct microwave measurement of Andreev-bound-state dynamics in a proximitized semi-conducting nanowire”, *Phys. Rev. Lett.* 121, 047001 (2018), arXiv:1711.01645.

[3] M. Hays et al., “Coherent manipulation of an Andreev spin qubit”, *Science* 373, 430 (2021), arXiv:2101.06701.

[4] C. Metzger, PhD thesis (2022), “Spin & charge effects in Andreev Bound States”, <https://hal.science/tel-03892704/>.

[5] Marta Pita-Vidal, Arno Bargerbos et al., “Direct manipulation of a superconducting spin qubit strongly coupled to a Transmon qubit”, arXiv:2208.10094.

Affiliation de l’auteur principal

CEA Paris-Saclay

Auteurs principaux: URBINA, Cristian (CEA-Paris Saclay); FLURIN, Emmanuel (CEA-Paris Saclay); POTHIER, Hugues (CEA-Paris Saclay); CACERES, Joan (CEA-Paris Saclay); GOFFMAN, Marcelo (CEA-Paris Saclay)

Orateur: POTHIER, Hugues (CEA-Paris Saclay)

Classification de Session: Session Poster 2: MC1, MC4, MC8, MC10, MC12, MC14, MC20, MC21, MC23, MC24, MC25, REDP

Classification de thématique: MC8 Dernières avancées dans le domaine des technologies quantiques