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 or 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 semiconducting 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