Contribution ID: **20** Type: **not specified**

Simulating a quantum battery on an quantum computer

Friday, 10 December 2021 11:25 (5 minutes)

Description

Aim of this project is to characterize the functioning of a quantum battery made by one or more qubits. In this kind of devices the charging phase can be achieved by means of a classical time dependent drive [1]. By using the tools provided for the pulse engineering [2] the optimal profile of the drive able to minimize the charging time, still leading to a full charge of the quantum battery (arbitrary initial state to excited state transition), will be determined. The energy fluctuation associated to this charging process will be considered in order to determine the stability and the efficiency of the device [3]. The typical discharging time of the battery towards the ground state once the drive is switched off will be also estimated. In the case of a quantum battery made by more than one qubit the role of mutual interaction among these subunits in the performance of the device will be also investigated [4].

[1] A. Crescente, M, Carrega, M. Sassetti, D. Ferraro, New J. Phys. 22, 063057 (2020).
[2] T. Alexander et al., Quantum Sci. Technol. 5, 044006 (2020).
[3] S. Gherardini, A. Belechia, M. Paternostro, A. Trombettoni, Phys. Rev. A 104, L050203 (2021).
[4] Y.-Y. Zhang, T.-R. Yang, L. Fu, X. Wang, Phys. Rev. E 99, 052106 (2019).

CERN group or section submitting a project proposal

Algorithm

Primary authors: Prof. FERRARO, Dario (University of Genova); Dr GROSSI, Michele (CERN)

Presenter: Dr GROSSI, Michele (CERN)

Session Classification: Project and collaboration proposals