International Conference on Quantum Energy 2025 hosted by Dipartimento di Fisica e Astronomia Galileo Galilei an event by ICQE

Contribution ID: **8** Type: **Oral presentation**

Extending the self-discharge time of Dicke quantum batteries using molecular triplets

Thursday 5 June 2025 18:05 (20 minutes)

Quantum batteries, quantum systems for energy storage, have gained interest due to their potential scalable charging power density. A quantum battery proposal based on the Dicke model has been explored using organic microcavities, which enable a cavity-enhanced energy transfer process called superabsorption. However, energy storage lifetime in these devices is limited by fast radiative emission losses, worsened by superradiance. We present a proof-of-concept device based on a multilayer optical microcavity, where an active absorption layer transfers energy to the molecular triplets of a storage layer. We experimentally realise this device and show that energy is stored for tens of microseconds–a 10^3-fold increase in storage time compared to previous demonstrations.

Theme

Theme 2. Quantum effects in energy processes and materials

Primary authors: Prof. GOMEZ, Daniel (RMIT University); TIBBEN, Daniel (RMIT University); CAMPAIOLI, Francesco (University of Padova)

Co-authors: Dr DELLA GASPERA, Enrico (RMIT University); Dr QUACH, James (CSIRO); Dr VAN EMBDEN, Joel (RMIT University); Dr REINECK, Philipp (RMIT University)

Presenter: TIBBEN, Daniel (RMIT University)

Track Classification: Theme 2. Quantum effects in energy processes and materials