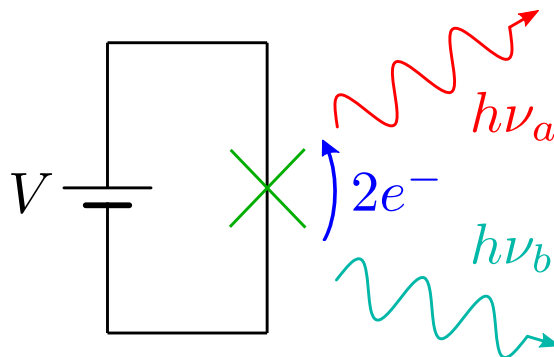

Dynamical Coulomb Blockade: from Electronic Fluctuations to Quantum Microwaves

PHD DEFENSE **Olivier PARLAVECCHIO**
DONE AT SPEC UNDER THE SUPERVISION OF **Fabien PORTIER**

CEA SACLAY, ORME DES MERISIERS,
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In this thesis work, I have focused on two aspects of the charge-light interaction for tunnel junctions. On one hand, I have investigated the influence of the coupling to electromagnetic radiation on the dynamics of charge transfer through a normal tunnel junction when the impedance of its environment gets comparable to the resistance quantum $R_K = \frac{h}{e^2}$. We showed that the current fluctuations bear signature of the processes where one, two or three photons are emitted. On the other hand, we used a Josephson junction, embedded in a circuit made of two resonators at different frequencies, ν_1 and ν_2 , and biased at the voltage $2eV = h\nu_1 + h\nu_2$. We showed that the Josephson junction emits photon pairs corresponding to a non classical state of radiation which violates the Cauchy-Schwarz inequality.

Our results extend the toolbox for performing quantum optics experiments in the microwave domain.

You are invited to the drinks party that will follow the defense.