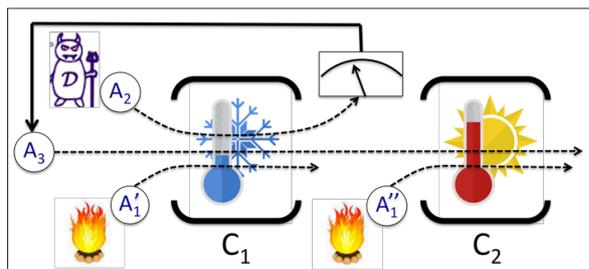


## Post-doctoral position in Cavity Quantum Electrodynamics: Quantum thermodynamics in cavity QED

A post-doctoral position is available to develop and conduct experiments on quantum thermodynamics in a microwave cavity QED system with Rydberg atoms and high-quality superconducting cavities.

The proposed research is included in the ANR project “*QuDICE*”, in collaboration with a theoretical group at Neel Institute (Dr. A. Auffèves, Grenoble, France) and an experimental group in the C2N laboratory (Dr. P. Senellart, Palaiseau, France). The main project objective is to study the laws of thermodynamics if the working substances, batteries and baths are quantum entities and thus to address problems of both fundamental and practical nature, like e.g. how to define heat, work and entropy production in the quantum regime? Is quantum coherence some energetic resource? What is the energetic cost of quantum information processing?



The LKB partner team specializes in a high-precision control of individual quantum systems: atoms and photons. The different elements of the existing cavity QED experimental setup (cavities C, atoms A) can model, at the very fundamental, quantum level, different entities of a typical thermodynamic system: heat reservoirs, environment and batteries, as well as implement

coherent work extraction and dissipative heat transfer between them. In addition, tailored atom-photon interaction can serve as a Maxwell's demon (D), allowing us to realise a measurement-powered engine. The ultimate goal is the demonstration of the work extraction from quantum coherence.

The work is mainly experimental: the post-doctoral researcher will have to conduct and analyse experimental protocols, participate in their discussion with our partners, adapt and maintain the experimental set-up.

### Skills:

- Good knowledge of quantum optics, light-matter interaction, lasers, ...
- Knowledge in cryogenics is welcome

**Funding:** the project is funded by the ANR grant *QuDICE*

**Starting date:** flexible, summer of 2019

**Duration:** 1 year

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