

INTERNSHIP PROPOSAL

(One page maximum)

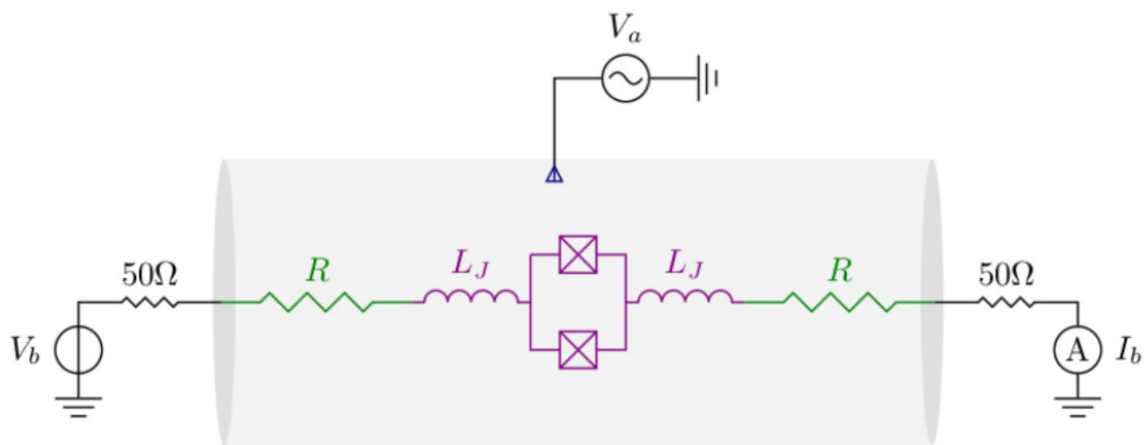
Laboratory name: Jeunes Equipe de l'Institut de Physique, Collège de France
CNRS identification code: USR3573
Internship director's surname: Girit
e-mail: caglar.girit@college-de-france.fr Phone number:
Web page: http://phi0.org
Internship location: Collège de France, Paris

Thesis possibility after internship: YES
Funding: YES If YES, which type of funding: ANR

Bloch oscillations with Josephson junctions

The Josephson effect, describing tunneling of Cooper pairs, is the foundation of superconducting quantum circuits. As a circuit element a Josephson junction can be considered a coherent non-linear inductor with a periodic energy dependence on magnetic flux. The dual to this circuit element, called a phase slip junction, would be a coherent non-linear capacitor with a periodic energy dependence on electric charge. Such an element would satisfy all the requirements for a superconducting qubit, and due to the possibility of voltage Bloch oscillations, which synchronize charge transfer to a microwave pump cycle, could be incorporated into a quantized current source.

The internship candidate will fabricate a design for a phase slip junction based on a small Josephson tunnel junction embedded in a high-impedance superconducting cavity and connected to resistive leads. The ultimate goal will be to measure signatures of voltage Bloch oscillations. The internship and eventual thesis will be carried out as part of a collaborative ANR project with researchers at MPQ-Paris, CEA-Saclay, and Institut Néel, Grenoble.



Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: YES Soft Matter and Biological Physics: NO
Quantum Physics: YES Theoretical Physics: NO