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Weak and strong non-linear effects in Josephson junction chains

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I will present our microwave transmission measurements on propagation modes in Josephson junction chains containing several hundreds of junctions. After some preliminary measurements we have done a more systematic measurement in an improved measurement set-up that I will present. Some of the chains have been embedded into the microwave strip line, while others have been coupled capacitively to it. The latter configuration enables a study of the internal quality factor of the chain while the first one is more suited to study quantitatively the Kerr effects occurring between different modes in the chain. The experimental dispersion curve of this meta- material fits well the theoretical prediction. We measured the Self- and Cross Kerr effects by two-tone spectroscopy measurements for the first 8 modes of the chain and compare them to theory. Secondly, I will show our recent results on the realization of a fluxonium qubit. I will discuss spectroscopy measurements and measurements of the relaxation and decoherence time of this qubit. At the end I will discuss future experiments with fluxonium type devices.

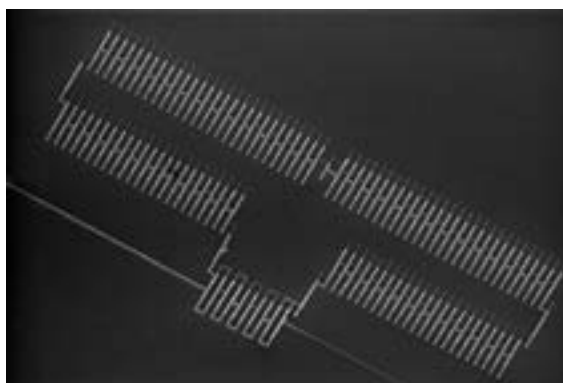


Figure 1: A fluxonium qubit fabricated at the Néel Institute Grenoble

Biography

Wiebke Guichard is a Professor at University Grenoble Alpes. During her PhD in the low temperature laboratory CRTBT/CNRS in Grenoble, she realized the first phase-sensitive measurement of a ferromagnetic hybrid π -junction. Her Postdoc research at KTH in the group of David Haviland, dealt with Bloch oscillations both in a single junction and in a Cooper pair transistor (CPT), coupled to a highly resistive environment consisting of SQUID arrays. Since September 2004, she is working in the Superconducting Quantum Circuit group in the Neel Institute in Grenoble together with Olivier Buisson and Nicolas Roch. She worked at the beginning on a coupled qubit-circuit between a phase-qubit and a charge qubit. Since 2008, she is working on quantum dynamics in Josephson junction chains and currently she is supervising a project on non-linear effects in Josephson junction chains.

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