



End of the year report

PhD Nanoscience @SNS

Student: Andrea Iorio
Supervisor: F. Giazotto

17th October, 2019

Exams and courses attended

Courses & exams

- Seminar series on Condensed Matter Physics (*done 11/07*)
- Quantum Information Theory (*done 25/09*)
- Physics of Nanostructures (*to be done in the next weeks*)
- Physics of many-body system (*attended only*)

Schools & conferences

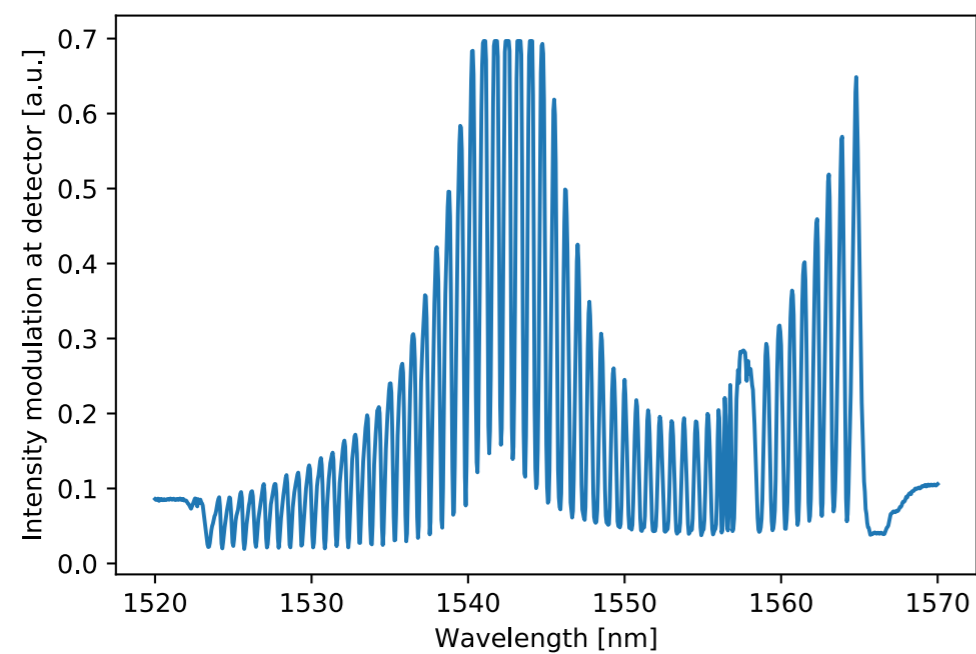
- NEST Highlights in Nanoscience (Workshop, Pisa)
Poster presentation "Revealing the Spin-Orbit Interaction in InAs nanowires"
- Nanotechnology meets Quantum Information (Summer school, San Sebastiàn)
Poster presentation "Revealing the Spin-Orbit Interaction in InAs nanowires"
- Nanowire Week 2019 (Conference, Pisa)



Stages @NEST

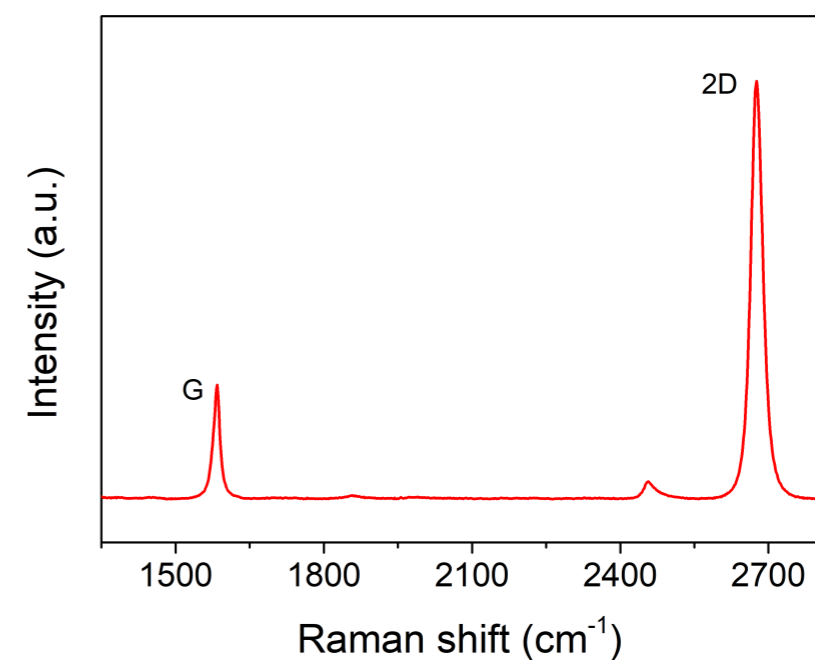
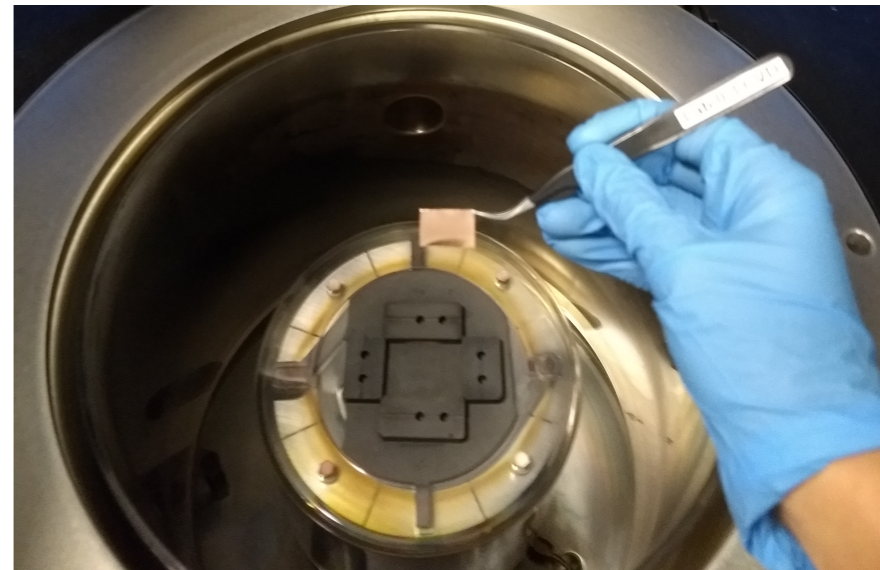
Optical characterization of metasurfaces and photonic crystals

A. Pitanti, S. Zanotto



CVD growth and characterization of graphene

C. Coletti, S. Pace



PhD research project - Introduction

Josephson Junction: two superconducting electrodes connected by a weak-link

Thin insulating barrier



Semiconductor nanowire



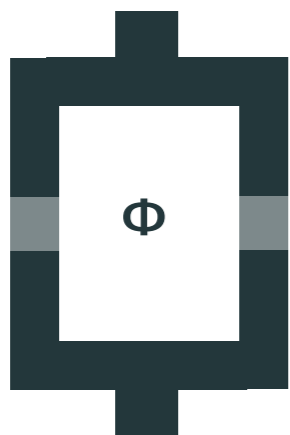
Metallic nanowires



Critical current: maximum supercurrent the junction can carry
Its tunability is fundamental for a variety of applications

NEW! Discovered in 2018

SQUID with external flux



External gate voltage



External gate voltage



PhD research project - State of the art

Present

Metallic field-effect extensively studied in DC transport (2018 -)

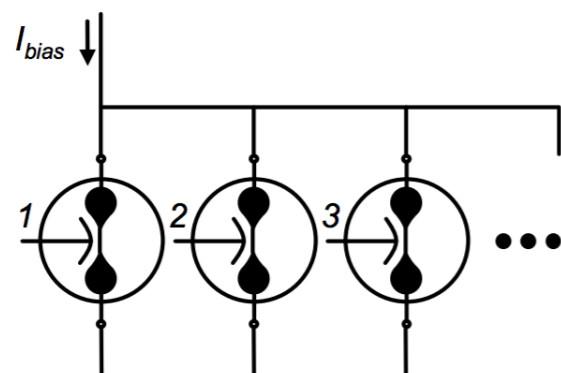
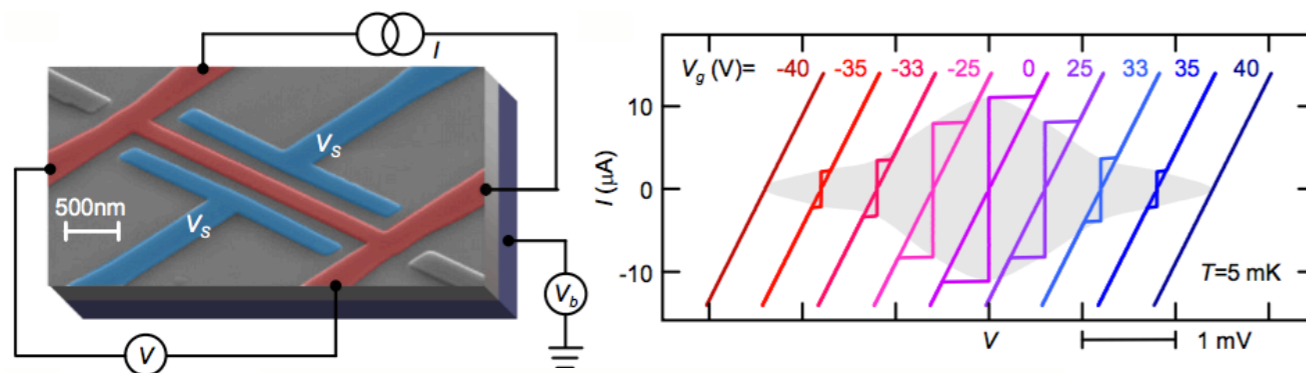


Future

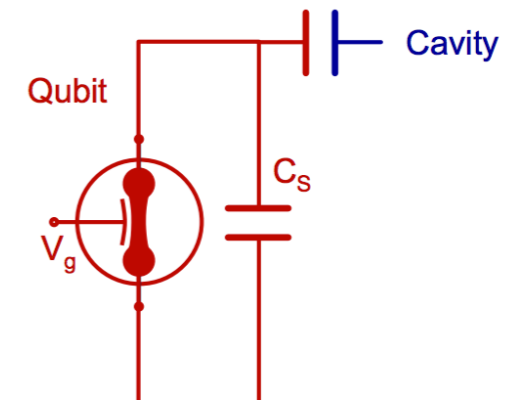
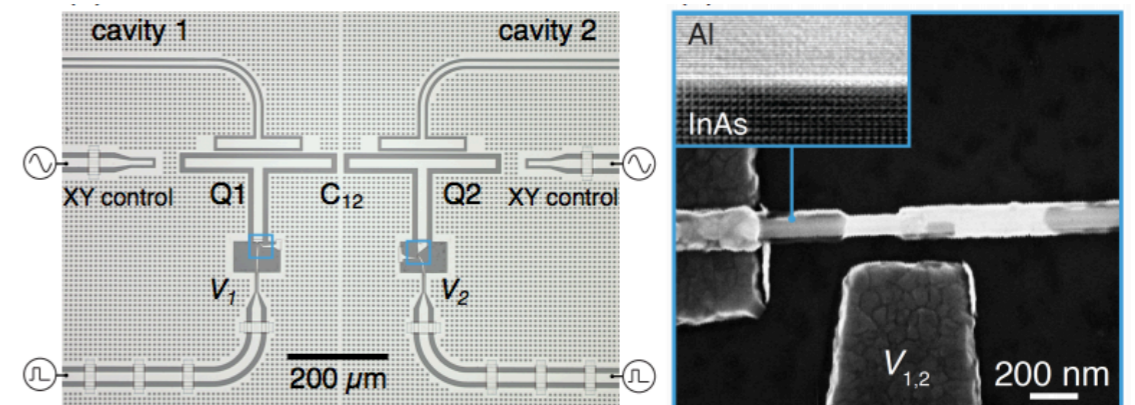
Towards its implementation in the radiofrequency (RF) GHz regime

Two main research lines to investigate

Fast superconducting non-dissipative classical computation



Fully gate-tunable metallic quantum computation



PhD research project - Outline and perspectives

