PhotonHub Demo Centre

Graphene photonics for mm-wave wireless links

Course Provider

CNIT, Pisa

Italy

Course Overview

Wireless communications approaching mmWaves (28GHz - 150GHz) carrier frequency will be key enabling technologies for 5G/6G, radars, ultrastable frequency references. This applications will require very high-speed devices mixers capable of enabling the implementation of such networks and sensors.

In this proposed demo, the attendee will have the opportunity to see first-hand an advanced mm-wave optoelectronic set-up demonstrating ~100 GHz radio link implemented by photomixing in a graphene photonic integrated circuit.

The course will be divided in two parts:

1) A theoretical part, in the morning, in which the attendees will have an overview on graphene optoelectronics and related applications, with focus to graphene-based microwave photonics.
2) A practical part, in the CNIT PNTLab, in which the graphene-based wireless link demonstrator will be shown, discussed and the attendee will be involved in a hands on experience.

Target Audience

It is desirable but not essential that course attendees have a basic understanding of photonics and solid state electronics. The course is ideally suited to those interested in graphene technology, and in the utilization of this material in microwave applications.

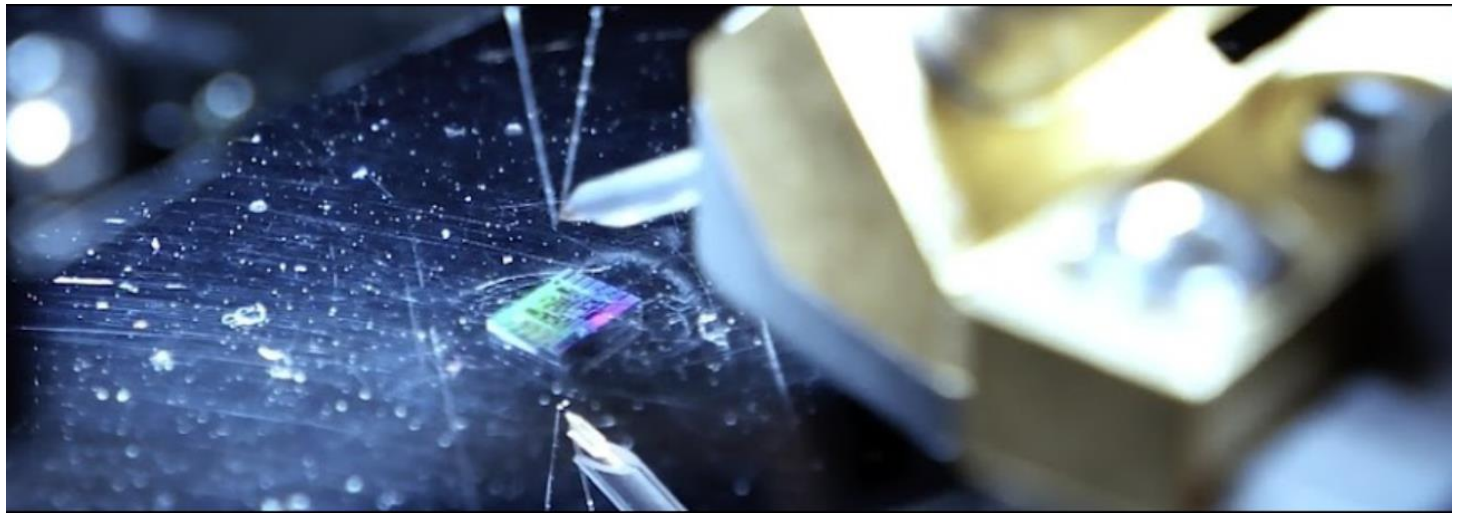
Expected Outcomes

1) Understanding the opto-electronic properties of graphene
2) Have an overview of the potential applications of graphene in the field of photonics and microwave photonics
3) See and evaluate a graphene optoelectronic device (hands on)

Course Schedule

Time	Demo Activity
09:00 – 10:30	Introduction to graphene photonics and electronics
11:00 – 12:30	Application: Graphene microwave photonics
14:00 – 16:00	Demo 1: Photonic enabled Graphene-based mm-wave wireless link
16:00 – 16:30	Follow-Up Questions & Close

Course Trainers



Course Director: Dr. Marco Romagnoli

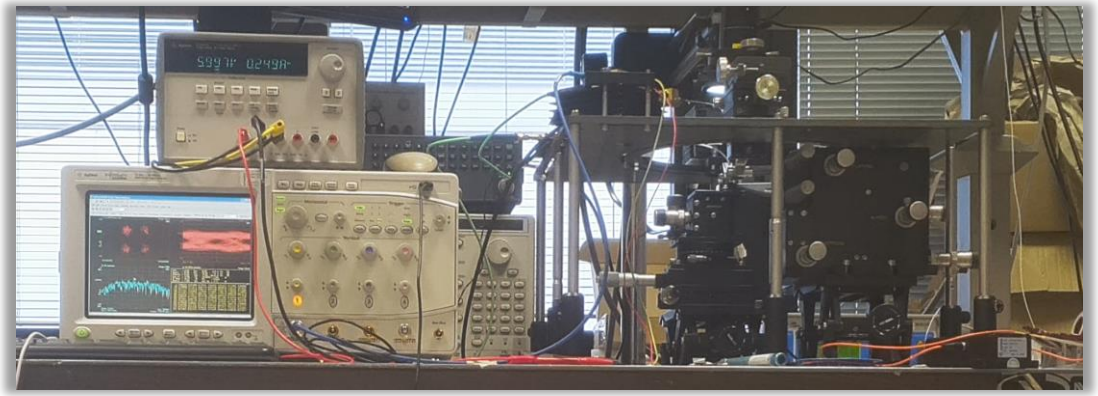
Course Manager: Alberto Montanaro

Lectures: Dr. Vito Sorianello, Dr. Alberto Montanaro

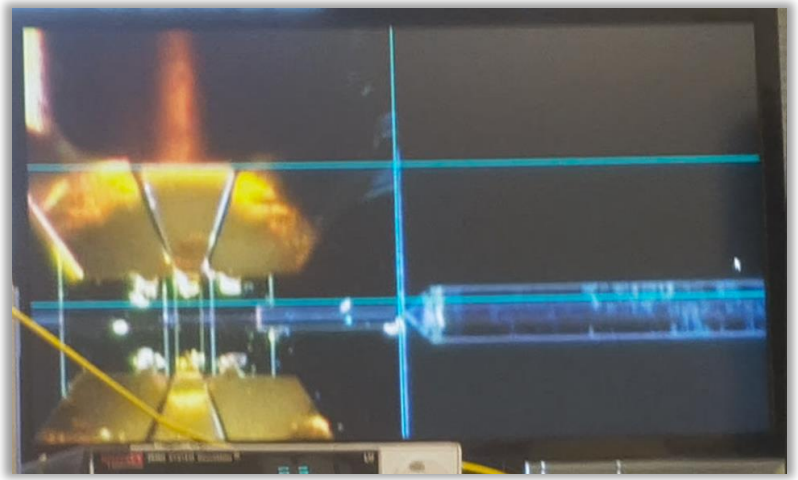
Demo 1: Dr. Alberto Montanaro

Course Demonstrator

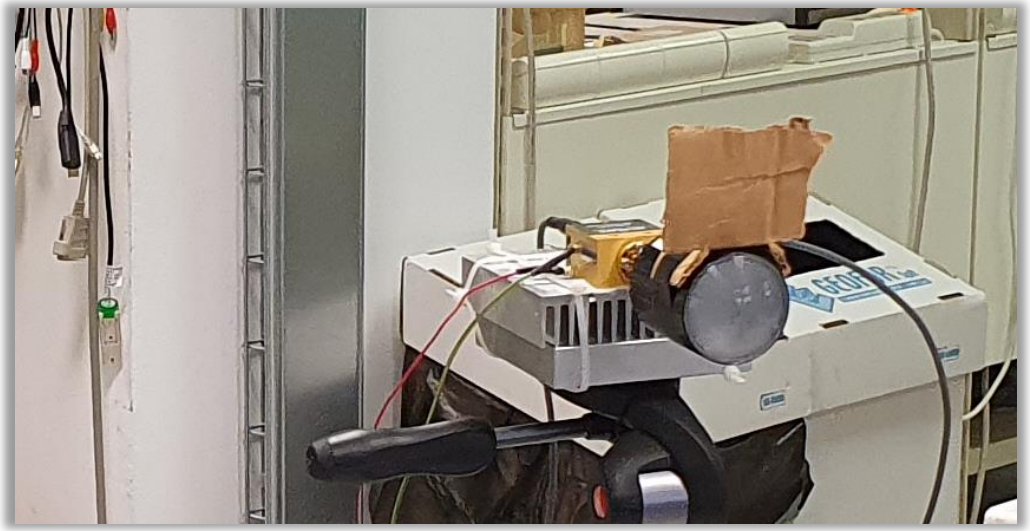
mm-wave wireless link



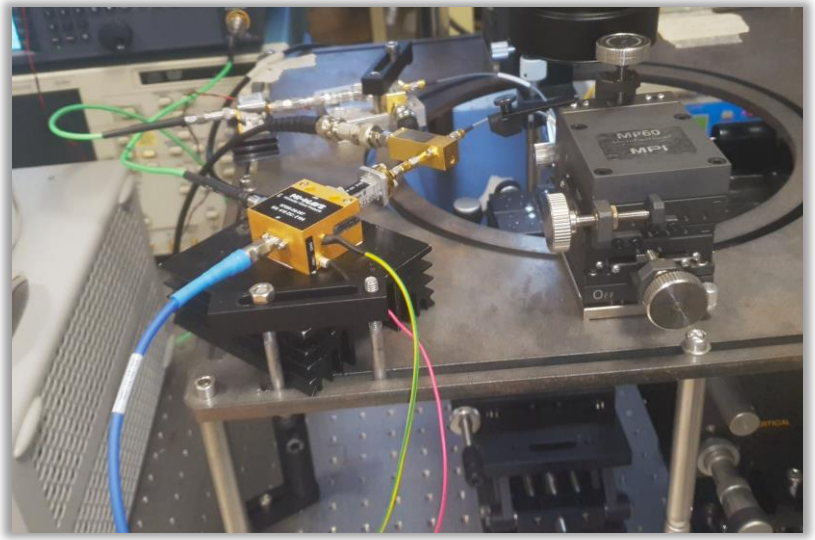
mmWave setup and RF signal displayed at the oscilloscope



Fiber couplig to the photomixing graphene on SiN waveguide chip



mmWave horn lensed antenna for 100GHz transmission



mmWave setup: RF signal amplification line

Course Location, Schedule & Cost

c/o TeCIP Institute,
Via Giuseppe Moruzzi,1 – Pisa
Italy

- Course Schedule (July, December – exact dates to be confirmed, starting from December 2021)
- Number of people (Groups of 9 people per course)
- Course Cost (**250 Euros per person**, includes catering and project consumables)

Further Information

- mromagnoli@cnit.it
- www. https://pntlab.cnit.it/
- www.photonhub.eu/euphotonicsacademy

Course Material available soon (technical hand-outs)

Keywords

Grpahene photonics, graphene optoelectronics, graphene microwave photonics, fiber optics, mm-wave, wireless link, PICs, integrated photonics, RF Equipment

Relevant Technology & Application Domain

Technology: graphene on SOI or Si3N4 PICs

Application: Telecommunications