

# Light and communication

Welcome speech, 16:00-16:15

## Invited Speakers

Dr. Mattia Mancinelli, University of Trento, 16:15-17:00

### **Optical fibers: glass microwires to communicate**

Light is being more and more the preferential way to exchange information. Immunity to electromagnetic disturbance, huge data bandwidth and inherent support for long-range transmission are just a few benefits related to the use of light to communicate. Nowadays, rapid technological evolution led optical-based communication to be the best choice where high performances are required. The talk will give an elemental introduction to the concepts behind optical-based communication: the fundamental physics laws behind the 'waveguiding' effect, the methods to fabricate optical fibers and the hidden 'digital language' with which machines talk. These are the ingredients to evolve from the rudimentary techniques used at the dawn of communication to the state-of-the-art optical fiber networks.

Dr. Alessandro Sturniolo, SM OPTICS, 17:00-17:45

### **Impact of photonics technology in modern communication networks**

The evolution of cultural and economical trajectories brought a progressive global interlacing that, at the same time, dragged and was enabled by, the development of modern communications. In this dynamic, photonics played a major role in transmitting big volumes of data, with high rates, low latencies and costs as never seen before. What was the object of interest for a few institutions and actors, both local and global, has grown in a fabric pervading every aspect of daily life through the Internet. This brought photonics from a niche technology to a basic domestic utility. The photonic commoditization was enabled by the development of a wide range of photonic devices that were integrated in modern networks in time, increasing both their manufacturing and management. Today, new applications are arising for photonics devices and networks, adding new functionalities to optical communications and other fields.

Dr. Marco Avesani, University of Padova, 17:45-18:30

### **Quantum Key Distribution: how to secure data transmission with quantum mechanics**

The secure transmission of sensitive data between distant parties is a major challenge for today's communication networks. However, the security of current cryptographic systems is threatened by the rapid development of quantum information protocols and quantum computers. A solution to this problem is given by Quantum Key Distribution (QKD) which, exploiting the laws of Quantum Mechanics, allows two distant users to distill perfectly secret keys with unconditional security. To increase its adoption, simple, low-cost, and robust systems are necessary, together with demonstrations in real environments. Here, I will discuss the basic principles of QKD and I will present a series of recent experimental implementations and field trials aimed to deploy QKD in classical communication infrastructures. Moreover, I will discuss the possible applications of QKD and the challenges of developing commercial QKD devices.

**Informal Discussion will follow during an aperitif**

Wednesday 14 December 2022

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University of Trento,

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