



Trento - Innsbruck Quantum Information Tour

About the talks in Trento

The following is a listing and brief description of all talks taking place in Trento.

BEC

- **Quantum mechanics applied to condensed matter** (11:00 - 11:30)
Franco Dalfovo: Full professor at the University of Trento and head of the INO-CNR unit in Trento
Presentation of an outline of the theoretical and experimental research taking place at the BEC center in Trento on the study of quantum gases and superfluidity phenomena.
- **Physics of vortices in superfluids** (11:30 - 12:10)
Giacomo Lamporesi: CNR researcher at the BEC Center
How to make and observe in the laboratory quantum gases containing vortices. Study of vortex dynamics in superfluids and of their interaction mechanisms.
- **Topological states of matter in cold atoms** (12:10 - 12:50)
Marco Di Liberto: Postdoc at INO-CNR BEC Center and physics department, University of Trento
After an overview of the integer and fractional quantum Hall effect, the main discussion shall focus on the challenges with cold atoms and the contribution of the BEC center in this field. In particular, I will discuss topological superfluids, edge states of two bound particles and simulation of the Hall effect in extra artificial dimensions.

Nanolab

- **Optical Quantum Technologies at UniTN laboratories** (14:00 - 14:30)
Lorenzo Pavesi: Physics department director and full professor at Trento
The talk aims to introduce the importance of and the growing attention given to quantum technologies, as supported by a great European investment. It is in this context under which the University of Trento, and the Nanoscience group in particular, works. The director will introduce the main current and future projects of the field, which aim to investigate the quantum properties of light on the scale of integrated silicon chips.
- **Quantum optics on chips** (14:30 - 15:00)
Massimo Borghi: Postdoc fellow
This talk will introduce the elements of an integrated quantum optics network, with an emphasis on the benefits that this platform can provide in terms of scalability, stability and cost, compared to a macroscopic optical network in which the photons propagate in free space.

- **Fluid light: an analogy with ultracold condensed gases** (15:00 - 15:30)

Stefano Biasi and Fabio Turri: PhD students

There is an analogy between the propagation of a perturbation in a Bose-Einstein condensed system and the propagation of a beam of light in an integrated waveguide when it enters the nonlinear regime. After introducing the model that predicts this analogy and its parameters, a possible experiment will be described thanks to which this phenomenon can be verified by exploiting the advantages of integrated optics.

- **Quantum Random Number Generation for Secure Communication and SiQuero movie** (15:30 - 16:00)

Zahra Bisardi: PhD student

Security of data transmission is of paramount significance in the modern world. Therefore, it is highly essential to encrypt the data transmitted through communication channels using secret keys based on random numbers. In this talk I will present our robust approach to generating high quality random numbers for applications in cryptography and secure communication in everyday life.