



UNIVERSITÀ  
DEGLI STUDI  
DI TORINO



Dipartimento di Fisica

## Seminar



**Prof. Vittorio Bellani**



Università di Pavia, Dipartimento di Fisica  
Istituto Nazionale di Fisica Nucleare, Sezione di Pavia

**Electrons and photons in graphene and bi-dimensional materials; observation of new quantum properties exploited in electronics, optics, and photonics.**

**Friday, May 21<sup>st</sup> h 14:00**

**WEBEX link:**

<https://unito.webex.com/unito/j.php?MTID=mc8bcd5220f60da1f1587295abcb8e57d>

Graphene and bi-dimensional materials have unusual new quantum properties. I will describe how the experiments are discovering new states which are neither fermions nor bosons, but “anyons” [1], the existence of special quantum butterflies [2] and that the quantity of light absorbed by graphene is quantized [3]. I will show how engineers and physicists are exploiting these new quantum properties, and other ones, in the fields of electronics, optics, and photonics.

1. “Welcome anyons! Physicists find best evidence yet for long-sought 2D structures”, Nature (2020): <https://www.nature.com/articles/d41586-020-01988-0>
2. “Hofstadter’s butterfly spotted in graphene”, Physics World (2013): <https://physicsworld.com/a/hofstadters-butterfly-spotted-in-graphene/>
3. “Fine Structure Constant Defines Visual Transparency of Graphene”, Science (2008): <https://science.sciencemag.org/content/320/5881/1308>  
[http://www.condmat.physics.manchester.ac.uk/pdf/mesoscopic/publications/graphene/Science\\_2008fsc.pdf](http://www.condmat.physics.manchester.ac.uk/pdf/mesoscopic/publications/graphene/Science_2008fsc.pdf)



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## The speaker



After graduating in Physics in the 2000s, Vittorio Bellani spent 3 years at the Swiss Federal Institute of Technology Lausanne, working on optical spectroscopy of nanomaterials; he successively got his PhD in Physics.

He afterwards became research scientist at University Autonoma de Madrid, Spain, working on ultrafast- optoelectronic and optics in magnetic fields in nanomaterials.

He is Professor at University of Pavia since 1996. In recent years he spent research stays at several internationally recognized laboratories, among which Massachusetts Institute of Technology (on graphene/lithium batteries), Berkeley University (graphene scanning probe microscopy), European Magnetic Field Laboratory (graphene and 2D materials at high magnetic fields).