



## SEMINARIO (N.2)

# The Signature of Quantum Physics

**Fabio Antonio BOVINO**

*Quantum Optics Lab Selex-ES Finmeccanica*

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*AULA SEMINARI- Dip. Scienze di Base e Applicate per l'Ingegneria  
Pal. E - Via Scarpa 16 -ROMA*

Although there are still many open problems, nowadays, *Quantum Information Theory* has established Entanglement as a key ingredient and a fundamental resource for *Quantum Communication, Quantum Information Processing and Quantum Computing*. Entanglement has always been a key issue in the ongoing debate about foundations and interpretation of Quantum Mechanics, since Einstein and Schroedinger expressed their deep dissatisfaction about this astonishing part of Quantum Theory. For a long time discussions about entanglement were purely meta-theoretical (sometime meta-physical). This situation was changed in 1964 by John Bell's consideration that the Einstein-Podolsky-Rosen (EPR) paradox could be formulated in the form of assumptions naturally leading to a falsifiable prediction. Whereas until 1989, entanglement was widely believed to be equivalent to the violation of a Bell Inequality, it turned out that such a violation is neither necessary for mixed entangled states nor a good measure for the amount of entanglement and the question, whether a given quantum state is entangled or merely classically correlated, is still a dilemma. A number of key issues and experiments related to the entanglement will be discussed.

**Fabio Antonio Bovino** was employed at Elsag, a Finmeccanica Company, in September 2001 (at Selex-ES from January 2013). He is the founder and the chief scientist of Quantum Optics Lab. He has participated in national and international research projects financed by MIUR, Italian Ministry of Defense, and European Community. He is author of more the 80 publications in national/international journals, and 12 patents in the fields of Foundation of Quantum Mechanics, Quantum Optics, Quantum Information and Computing. Highlights are the first demonstration of a quantum cloning machine (2001), the first experiment beyond Bell's Inequalities for entanglement characterization (2004), the realization of the first Quantum Cryptography Italian product: the Q-KeyMaker®. He is Lecturer at ICTP "The Abdus Salam International Centre for Theoretical Physics" and at Ettore Majorana Foundation and Centre for Scientific Culture, where he was, in 2012, Director of Course "Advances in Nanophotonics". He is member of the teaching and scientific board of the Second Level Master on Optics and Quantum Information of the University of Rome "Sapienza".

Personal WebSite <http://it.linkedin.com/in/fabioantoniobovino>

**Tutti gli interessati sono invitati a partecipare**

**Per informazioni:**

Dip.SBAI – Univ. 'La Sapienza'

Tel 06.49766541- [concita.sibilia@uniroma1.it](mailto:concita.sibilia@uniroma1.it)