



Real  
Sociedad  
Española de  
Física

**FUNDACIÓN  
RAMÓN ARECES**



*Conferencias de divulgación científica de la Real Sociedad Española de Física  
en colaboración con la Fundación Ramón Areces  
Ciclo Hablemos de Física, Facultad de Ciencias Físicas (UCM)*

# ***From the Einstein-Bohr debate to quantum information: a new quantum revolution***

***Alain Aspect***

***Institut d'Optique Graduate School, Palaiseau, France***

***JUEVES 26 enero 2017, 13.00h***

***Aula Magna Blas Cabrera, Facultad de Ciencias Físicas (UCM),  
Plaza de las Ciencias, 1 28040-Madrid***

## ***Abstract***

In 1935, with co-authors Podolsky and Rosen, Einstein discovered a weird quantum situation, in which particles in a pair are so strongly correlated that Schrödinger called them “entangled”. By analyzing that situation, Einstein concluded that the quantum formalism is incomplete. Niels Bohr immediately opposed that conclusion, and the debate lasted until the death of these two giants of physics.

In 1964, John Bell discovered that it is possible to settle the debate experimentally, by testing the now celebrated "Bell's inequalities", and to show directly that the revolutionary concept of entanglement is indeed a reality. A long series of experiments, started in 1972, have produced more and more precise results, in situations closer and closer to the ideal theoretical scheme.

After explaining the debate, and describing some experiments, I will show how this conceptual discussion has prompted the emergence of the new field of quantum information, at the heart of the second quantum revolution.