



SPEAKER: Prof. Alain ASPECT (Institut d'Optique Palaiseau)

TITLE: **Hanbury Brown and Twiss and other atom-atom correlations: advances in quantum atom optics**

DATE: Thu 12/06/2008 16:30

PLACE: Main Auditorium **

ABSTRACT

Fifty years ago, two astronomers, R. Hanbury Brown and R. Q. Twiss, invented a new method to measure the angular diameter of stars, in spite of the atmospheric fluctuations. Their proposal prompted a hot debate among physicists : how might two particles (photons), emitted independently (at opposite extremities of a star) , behave in a correlated way when detected ? It was only after the development of R Glauber's full quantum analysis that the effect was understood as a two particle quantum interference effect. From a modern perspective, it can be viewed as an early example of the amazing properties of pairs of entangled particles.

The effect has now been observed with bosonic and fermionic atoms, stressing its fully quantum character. After putting these experiments in a historical perspective, I will present recent results, and comment on their significance. I will also show how our single atom detection scheme has allowed us to demonstrate the creation of atom pairs by non linear mixing of matter waves. This result paves the way to experiments aiming at probing entanglement in atom pairs.