



Liberté • Égalité • Fraternité  
RÉPUBLIQUE FRANÇAISE  
CONSULAT GÉNÉRAL DE FRANCE  
À HONG KONG



INSTITUT DE FRANCE  
Académie des sciences



香港城市大學  
City University  
of Hong Kong

# Measuring Time: Atomic Clocks and Ultracold Atoms

by

## Claude COHEN-TANNOUDJI

*1997 Nobel Laureate in Physics*

*Laboratoire Kastler Brossel, Ecole Normale Supérieure, Paris*

*Professor at the Collège de France*

*Member of the French Academy of Sciences*

*Chair Professor-at-Large, City University of Hong Kong*

FRANCE – HONG KONG  
DISTINGUISHED  
LECTURE SERIES

*A series of high-profile lectures  
under the auspices of  
the French Academy of Sciences*

Date: Tuesday, 27 February, 2007  
Time: 5:00pm  
Venue: Lecture Theatre 10 (LT10),  
Academic Building,  
City University of Hong Kong  
Enquiries: Miss Annie Yeung  
Tel: 2788 8069  
Fax: 2788 7097  
Email: yeunghy@cityu.edu.hk

**Abstract:** Time measurement is based on the use of periodic phenomena like the rotation of the earth, the oscillation of a pendulum or the vibration of a quartz crystal. The oscillation frequency of the radiation emitted or absorbed by an atom undergoing a transition between two energy levels has the advantage of being universal since it is the same for all atoms of the same type. An atomic clock is an oscillator whose frequency is locked on the frequency of an atomic transition.



Recent progress in the realization of cesium atomic clocks using laser cooled atoms will be described, leading to relative frequency stability in the range of  $10^{-16}$ , which corresponds to an error less than one second in  $3 \times 10^8$  years. The perspective of putting these clocks in a microgravity environment is very attractive. Several applications of these ultra precise atomic clocks are also being investigated and will be reviewed.

*Professor Claude Cohen-Tannoudji will also present a series of lectures on Selected Topics in Atomic, Molecular and Optical Physics in the Department of Physics and Materials Science, CityU, from February 28 to March 6, 2007.*

*All are Welcome*