

## Scientific Programme

Wednesday 30 April 2008

08:00 09:00 Registration

09:00 09:15 Welcome address  
Marc Henneaux (International Solvay Institutes & U L Brussels)  
Nicolas Cerf (U L Brussels)

### **Session 1: Quantum non-locality, entanglement, Bell tests, foundations of quantum mechanics**

**Theme leader : Thomas Walther**

*Auditorium Baron Lacquet*

09:15 10:00 Thomas Walther (U Darmstadt)  
*Quantum non-locality, entanglement, Bell tests, foundations of quantum mechanics  
(setting the scene / present day challenges)*

10:00 10:45 Nicolas Gisin (U Geneva)  
*Recent results on Bell tests and gravitationally-induced collapse*

10:45 11:15 **Coffee break** in the premises of the Palace of the Royal Academies (Atrium)

11:15 12:00 Alain Aspect (Institut d'Optique, Palaiseau)  
*From atomic Hanbury Brown and Twiss to atom entanglement: Perspectives in  
Quantum Atom Optics*

12:00 12:45 Artur Ekert (U Oxford)  
*Surprises in quantum and post-quantum cryptography*

12:45 13:30 **Lunch buffet** in the premises of the Palace of the Royal Academies (Atrium)

13:30 14:30 **Poster session # 1** in the premises of the Palace of the Royal Academies (Atrium)

### **Session 2: Nonlinear optical systems, synchronization, consistency, biomimetic photonics**

**Theme leader : Fortunato Tito Arecchi**

*Auditorium Baron Lacquet*

14:30 15:15 F. Tito Arecchi (U Firenze)  
*Synchronization of a chaotic array : from lasers to neurons  
(setting the scene / present day challenges)*

15:15 16:00 Rajarshi Roy (University of Maryland)  
*Nonlinear dynamics and chaos in Lasers: synchronization and communication*

16:00 16:30 **Coffee break** in the premises of the Palace of the Royal Academies (Atrium)

16:30 17:15 Atsushi Uchida (Saitama University)  
*Synchronization and consistency in chaotic lasers*

17:15 18:00 Wolf Singer (Max Planck Institute for Brain Research, Frankfurt)  
*Synchronization in neuronal networks: The basis for temporal codes*

18:30 20:30 **Welcome drink** in the premises of the Palace of the Royal Academies (Atrium)

## Scientific Programme

Thursday 1 May 2008

### Session 3: Communication and cryptography based on quantum physics

Theme leader : **Philippe Grangier**

*Auditorium Baron Lacquet*

- 09:00 09:45 Philippe Grangier (Institut d'Optique, Palaiseau)  
*Communication and cryptography based on quantum physics  
(setting the scene / present day challenges)*
- 09:45 10:30 Hugo Zbinden (U Geneva)  
*Faint laser QKD : technical challenges for a high bit rate prototype*
- 10:30 11:00 **Coffee break** in the premises of the Palace of the Royal Academies (Atrium)
- 11:00 11:45 Gerd Leuchs (U Erlangen-Nuremberg)  
*Communication, amplification, and noise filtering with continuous variables*
- 11:45 12:30 Serge Massar (U Brussels)  
*Quantum key distribution with untrusted devices*
- Conference group picture
- 12:30 13:30 **Lunch buffet** in the premises of the Palace of the Royal Academies (Atrium)
- 13:30 14:30 **Poster session # 2** in the premises of the Palace of the Royal Academies (Atrium)

### Session 4: Communication and cryptography based on nonlinear classical physics

Theme leader : **Claudio Mirasso**

*Auditorium Baron Lacquet*

- 14:30 15:15 Claudio Mirasso  
*Chaos-based communications : the concept becomes reality  
(setting the scene / present day challenges)*
- 15:15 16:00 Daan Lenstra (T U Delft)  
*Integrated photonic device for chaotic communication*
- 16:00 16:30 **Coffee break** in the premises of the Palace of the Royal Academies (Atrium)
- 16:30 17:15 Laurent Larger (University of Franche-Comté, France)  
*Optical chaos-based cryptography*
- 17:15 18:00 Ido Kanter (Bar-Ilan University, Israel)  
*Information-theoretic approach: chaos synchronization and Hilbert's Tenth Problem*
- 19:00 22:00 **Conference reception** at the Brewer's House (10, Grand Place)
- Speech by Elisabeth Giacobino (Laboratoire Kastler Brossel, Paris)  
*Quantum information in Europe : an entangled world*

## Scientific Programme

Friday 2 May 2008

### Session 5: Advanced quantum photonic states processing (cat states, squeezed states, single photon states), cavity QED

Theme leader : Serge Haroche

Auditorium Baron Lacquet

- 09:00 09:45 Serge Haroche (Laboratoire Kastler Brossel, Paris)  
*Generating and reconstructing non-classical photonic states in Cavity QED: present stage and perspectives*
- 09:45 10:30 Gerhard Rempe (Max-Planck-Institut für Quantenoptik, Garching)  
*Cavity QED : from single atoms to two photons*
- 10:30 11:00 **Coffee break** in the premises of the Palace of the Royal Academies (Atrium)
- 11:00 11:45 Akira Furusawa (University of Tokyo)  
*Continuous-variable quantum information processing with squeezed states of light*
- 11:45 12:30 Michel Brune (Laboratoire Kastler Brossel, Paris)  
*Reconstructing the evolving Wigner function of a Schrödinger cat trapped in a cavity: a movie of decoherence*
- 12:30 13:30 **Lunch buffet** in the premises of the Palace of the Royal Academies (Atrium)
- 13:30 14:30 **Poster session # 3** in the premises of the Palace of the Royal Academies (Atrium)

### Session 6: Linear optics quantum computing, optical networks, quantum information processing, q. memory

Theme leader : Gerard Milburn

Auditorium Baron Lacquet

- 14:30 15:15 Gerard Milburn (University of Queensland, Australia)  
*Linear optics quantum computing, quantum information processing, quantum memory (setting the scene / present day challenges)*
- 15:15 16:00 Andrew White (University of Queensland, Australia)  
*Optical quantum computing: science fiction, horror story or news?*
- 16:00 16:30 **Coffee break** in the premises of the Palace of the Royal Academies (Atrium)
- 16:30 17:15 Eugene Polzik (Niels Bohr Institute, Copenhagen)  
*Gaussian and non-Gaussian quantum interface with atomic ensembles*
- 17:15 18:00 Julien Laurat (Laboratoire Kastler Brossel, Paris)  
*Quantum networking with atomic ensembles*
- 19:30 **Conference dinner** at the Hôtel Métropole (Excelsior room)
- Introduction speech by Franklin Lambert (VUB): *The beginnings of the Solvay Institutes for Physics and Chemistry – Legends and facts*
- After-dinner speech by Gilles Brassard (U Montréal): *A quarter century of quantum key distribution – A personal perspective*

## Scientific Programme

Saturday 3 May 2008

### **Session 7: Main outcomes of the workshop, conclusions, and perspectives**

**Theme leader : David Miller**

*Auditorium Baron Lacquet*

- |       |       |  |
|-------|-------|--|
| 09:00 | 09:45 | David Miller (Stanford)<br><i>Main outcomes of the workshop</i>  |
| 09:45 | 10:30 | John Dudley (University of Franche-Comté, France)<br><i>Fundamental physics and practical applications: a two way street</i>                           |
| 10:30 | 11:00 | <b>Coffee break</b> in the premises of the Palace of the Royal Academies (Atrium)  |
| 11:00 | 11:45 | Sir Peter Knight (Imperial College)<br><i>The interplay between quantum optics and quantum information: quantum resources and quantum exploitation</i> |
| 11:45 | 12:30 | Anton Zeilinger (University of Vienna)<br><i>Quantum Information and the Foundations of Quantum Mechanics</i>  |
| 12:30 | 12:45 | Final conclusions and perspectives<br>David Miller (Stanford)  |
| 12:45 | 13:45 | <b>Lunch buffet</b> in the premises of the Palace of the Royal Academies (Atrium)  |