The Abdus Salam International Centre for Theoretical Physics

1964 40th anniversary 2004

School and Workshop on Quantum Entanglement, Decoherence, Information, and Geometrical Phases in Complex Systems

Cosponsor(s): European Community Research Training Network QUACS, and Scuola Normale Superiore di Pisa, Italy
Organizer(s): V.M. Akulin, G. Kurizki, R. Fazio, J. Siewert, V. Vedral
Trieste - Italy, 01 - 12 November 2004

Venue: Main Building Main Lecture Hall

Final programme

Monday, 1 November 2004 (Room:Main Building Main Lecture Hall) (**All Saints**)

08:30 - 10:00	(Room: Main Building Lobby) **Registration**
10:00 - 10:15	**Opening Address**
10:15 - 11:25	**Sir M.V. Berry** / *University of Bristol, UK* **Opening Lecture**
11:25 - 11:40	--- Break ---

Quantum information and entanglement (I) (**All Saints**)

1 November 2004

11:40 - 12:50	**J. D. Bekenstein** / *The Hebrew Univ.of Jerusalem, Israel* **Entropy / information bounds and gravitation**
12:50 - 14:30	--- Lunch ---
14:30 - 15:40	**S. Stenholm** / *Royal Inst. of Tech.,Stockholm, Sweden* **Role of entropy in dynamical systems**

15:40 - 15:50 --- Break ---

15:50 - 17:00 **S. Braunstein** / *University of York, UK*
Quantum information and entanglement

17:00 - 17:10 --- Break ---

17:10 - 17:30 **Discussion**

Quantum measurements, entanglement and coherence (I) (Room:Main Building Main Lecture Hall)

2 November 2004

09:00 - 10:10 **Y. Aharonov** / *Tel-Aviv University, Israel*
What is really there in the quantum domain

10:10 - 11:20 **M. O. Scully** / *Texas A&M University, USA*
The quantum eraser

11:20 - 11:35 --- Break ---

11:35 - 12:45 **G. S. Agarwal** / *Oklahoma State Univ., USA*
Multiparticle entanglement

12:45 - 14:30 --- Lunch ---

14:30 - 15:40 **M. Heiblum** / *Weizmann Inst. of Science, Rehovot, Israel*
Controlled dephasing in mesoscopic systems

15:40 - 16:00 --- Break ---

16:00 - 17:10 **I. J. Cirac** / *Max-Planck-Inst. für Quantenoptik, München, Germany*
Multiparticle entangled states

17:20 - 18:00 **Directors and speakers, discussion**

18:30 - 18:30 (Room: Main Building Cafeteria)
--- GET-TOGETHER DRINK ---

Decoherence, its control and prevention (I) (Room:Main Building Main Lecture Hall)

3 November 2004

09:00 - 10:10 **W. H. Zurek** / *Los Alamos Nat. Laboratory, USA*
Quantum Darwinism

10:10 - 11:20 **G. Casati** / *Univ.degli Studi dell'Insubria, Como, Italy*
Quantum-classical correspondence in perturbed chaotic systems

11:20 - 11:35 --- Break ---

11:35 - 12:45 **A. G. Kofman** / *Weizmann Inst. of Science, Rehovot, Israel*
Unified approach to dynamical control of decoherence

12:45 - 14:30 --- Lunch ---

14:30 - 15:40 **G. Harel** / *University of Bradford, UK*
Control over dynamics and decoherence of complex systems

15:40 - 16:00 --- Break ---

16:00 - 17:10 **V. Geshkenbein** / *ETH, Zürich, Switzerland*
Josephson qubit: topological protection from decoherence

17:20 - 18:00 **Directors and speakers, discussion**

Poster session I

Quantum measurements, entanglement and coherence (II) (Room:Main Building Main Lecture Hall)

4 November 2004

09:00 - 10:10 **G. Rempe** / *Max-Planck-Inst.für Quantenoptik, München, Germany*
Wave-particle duality and quantum erasure in atom interferometry

10:10 - 11:20 **K. Bergmann** / *Univ. Kaiserslautern, Germany*
Coherent excitation control

12:00 - 14:00 --- Lunch ---

14:00 - 15:10 **C. W. J. Beenakker** / *Univ. of Leiden, Netherlands*
Entanglement and teleportation in the Fermi sea

15:10 - 16:20 **M. Buttiker** / *Univ. de Genéve, Switzerland*
Shot noise and orbital entanglement in mesoscopics

16:20 - 16:35 --- Break ---

16:35 - 17:45 **H. J. Carmichael** / *University of Auckland, New Zealand*
Stochastic Schroedinger equations

17:50 - 18:30 **Directors and speakers, discussion**

Quantum information and geometric phases (I) (Room:Main Building Main Lecture Hall)

5 November 2004

09:30 - 10:40 **D. Thouless** / *University of Washington, USA*
Quantum defects and topological quantum numbers

10:40 - 11:00 --- Break ---

11:00 - 12:10 **Y. Gefen** / *Weizmann Inst. of Science, Rehovot, Israel*
Berry phases, geometric dephasing and noise

12:10 - 14:30 --- Lunch ---

Decoherence, its control and prevention (II)

5 November 2004

14:30 - 15:40 **G. Schön** / *Universität Karlsruhe, Germany*
Josephson qubits: manipulations and decoherence

15:40 - 16:00 --- Break ---

16:00 - 17:10 **T. T. Basiev** / *GPI, Moscow, Russia*
Laser-induced dynamics and decoherence in rare earth doped crystals

17:20 - 18:00 **Directors and speakers, discussion**

19:00 - 19:00 (Room: Main Building Cafeteria)
--- GET-TOGETHER DRINK ---

QUACS Network: annual meeting/Sunday,7th/10:00-12:00 (Room:Adriatico Guest House Giambiagi Lecture Hall) (**Sunday**)

Monday, 8 November 2004 (Room:Main Building Main Lecture Hall)

08:45 - 09:00 **Directors' remarks**

Quantum information and entanglement (II)

8 November 2004

09:00 - 10:00 **A. Zeilinger** / *University of Vienna, Austria*
Information as a common principle of entanglement and decoherence

10:00 - 11:00 **M. Arndt** / *University of Vienna, Austria*
Which-path information, decoherence, dephasing in macromolecular interferometry

11:00 - 11:15 --- Break ---

11:15 - 12:15 **T. Opatrny** / *Palacky University, Czech Republic*
Position and momentum entanglement

12:15 - 14:00 --- Lunch ---

Entanglement and decoherence in complex systems (I)

8 November 2004

14:00 - 15:00 **S. Das Sarma** / *University of Maryland, USA*
Spin coherence and computation in semiconductor nanostructures

15:00 - 16:00 **F. Tafuri** / *Univ. di Napoli Federico II, Italy*
Entanglement and decoherence in high Tc nanostructures

16:00 - 16:15 --- Break ---

16:15 - 17:15 **D. Loss** / *University of Basel, Switzerland*
Decoherence of Spin Qubits in Quantum Dots

17:25 - 18:00 **Directors and speakers, discussion**

Decoherence, its control and prevention (III) (Room:Main Building Main Lecture Hall)

9 November 2004

09:00 - 10:00 **J. Jones** / *University of Oxford, UK*
Entanglement & NMR computation

10:00 - 11:00 **S. Pascazio** / *Univ. degli Studi di Bari, Italy*
Control of decoherence - different strategies

11:00 - 11:15 --- Break ---

11:15 - 12:15 **L. Viola** / *Darmouth College, USA*
Dynamical control of decoherence

12:15 - 14:00 --- Lunch ---

14:00 - 15:00 **G. Falci** / *Università di Catania, Italy*
Decoherence and control in Josephson nanocircuits

15:00 - 16:00 **M. Fleischhauer** / *Universität Kaiserslautern, Germany*
Decoherence control by collective mapping

16:00 - 16:15 --- Break ---

16:15 - 17:15 **K. Richter** / *Universität Regensburg, Germany*
Spin control and relaxation in mesoscopic transport

17:25 - 18:00 **Directors and speakers, discussion**

Poster session II

Entanglement in complex systems (II) (Room:Main Building Main Lecture Hall)

10 November 2004

09:00 - 10:00 **W. P. Schleich** / *Universität Ulm, Germany*
Multiparticle entanglement via boundary conditions

10:00 - 11:00 **R. Unanyan** / *Armenian Acad. of Sci., Ashtarak, Armenia*
Many-particle adiabatic entanglement

11:00 - 11:15 --- Break ---

11:15 - 12:15 **D. Petrosyan** / *FORTH/IESL, Crete, Greece*
Propagation, collisions and entanglement of electron wavepackets in quantum dot arrays

12:15 - 14:00 --- Lunch ---

14:00 - 15:00 **I.E. Mazets** / *A.F. IoffePhys.-Tech.Inst., St. Petersburg, Russia*
Collisions and entanglement in cold condensed matter

15:00 - 16:00 **A. C. Dreismann** / *TU Berlin, Germany*
Attosecond entanglement and decoherence

16:00 - 16:15 --- Break ---

16:15 - 17:15 **E. B. Karlsson** / *Uppsala University, Sweden*
Quantum coherence of protons in condensed matter

17:25 - 18:00 **Directors and speakers, discussion**

Quantum information and geometric phases (II) (Room:Main Building Main Lecture Hall)

11 November 2004

09:00 - 10:00 **H. Köppel** / *Universität Heidelberg, Germany*
Quantum dynamics of geometric phases in molecular physic

10:00 - 11:00 **N. Manini** / *Università di Milano, Italy*
Off-diagonal geometric phases

11:00 - 11:15 --- Break ---

11:15 - 12:15 **G. M. Palma** / *Università di Milano, Crema, Italy*
Geometric phases in the presence of noise

12:15 - 14:00 --- Lunch ---

14:00 - 15:00 **A. Stern** / *Weizmann Inst. of Science, Rehovot, Israel*
Electronic transport in an array of quasi-particles in a non-abelian quantum Hall state

15:00 - 16:00 **R. Whitney** / *Université de Genéve, Switzerland*
Non-orthogonal resonances, modified geometric phase and geometric dephasing

16:00 - 16:15 --- Break ---

16:15 - 17:15 **R. Mosseri** / *Université Paris 6, Paris, France*
Entanglement and topological phase in two-qubit systems

17:25 - 18:00 **Directors and speakers, discussion**

Entanglement in complex systems (III) (Room:Main Building Main Lecture Hall)

12 November 2004

09:00 - 10:00 **P. Pillet** / *CNRS, Lab. Aimé Cotton, Orsay, France*
Dipole blockade in Rydberg excitation of cold atoms

10:00 - 11:00 **J. Clausen** / *CNRS, Lab Aimé Cotton, Orsay, France*
Quantum dynamics affected by repeated ancilla measurements

11:00 - 11:15 --- Break ---

11:15 - 11:30 **G. Abd El-Kader** / *Al-Azhar University, Cairo, Egypt*
Entropy and entanglement in a two-level atom with Kerr media and superposition of squeezed displaced Fock states

11:30 - 11:45 **C. Benjamin** / *Ins. of Physics, Bhubaneswar, India*
Two examples in quantum pumping: - As a spin pump and as an order parameter resolver for High Tc superconductors

11:45 - 12:00 **Fei Shao-Ming** / *Beijing Normal University, P.R. China*
Quantum entanglement: Nonlocal properties and local invariants