

CURRICULUM VITAE OF GIACOMO MAURO D'ARIANO

Giacomo Mauro D'Ariano is full professor at the University of Pavia, where he teaches Foundations of Quantum Theory and Quantum Information. In Pavia he created the research group QUIT (Quantum Information Theory), a worldwide leading group in the field. He started Quantum Information in Italy, where he created a school that spread young disciples and scholars around the world. Fellow of the Optical Society of America, he is member of the Center for Photonic Communication and Computing at Northwestern University in Illinois, with which is regularly collaborating since 1994.

Giacomo Mauro D'Ariano has been national coordinator of 5 Italian projects PRIN, and local PI of numerous other Italian and European projects. He has been organizer of large conferences in relevant international institutions (including MIT, Northwestern University, Scuola Normale Superiore di Pisa), member of dozens of international steering and advisory scientific committees, he is currently President of the Steering Committee of QCMC Conferences, one of the most prominent series of conferences in Quantum Information that has been run in all continents since 1990.



With almost 300 published papers on peer-reviewed journals (105 on APS Journals, 30 PRL) and books (Google Scholar $h=40$, 5800 citations) and more than 170 invited talks, in his scientific journey D'Ariano has coordinated his team of students as a single brain, extracting new teaching from research, and producing new research from the teaching, in a relentless progress of the conceptual apparatus of Quantum Mechanics. He is popular for his work on quantum tomography---a field that he initiated and developed his first exact technique, now very popular, of quantum homodyne tomography. He generalized the technique---originally devised for optics---to a truly universal measurement method, conceiving and developing the first experimental schemes based on entanglement for the quantum characterization of transformations and apparatuses. He is well recognized for his numerous contributions to the theory of quantum measurements, where he introduced novel methods and solved long-standing problems (e.g. the optimal phase-estimation and broadcasting of mixed states), proposed new optical devices and experimental schemes for high sensitivity measurements, along with new measurements for experimental tests of quantum mechanics, novel theoretical approaches to quantum cloning and processing of quantum information. With his disciples P. Perinotti and G.

Chiribella he introduced the powerful notions of “quantum comb”, which generalizes the notions of channel and POVM, with a range of applications, from measurement optimization, to quantum protocols, to computing, and even to foundations of Quantum Mechanics. In the last decade D’Ariano got much interest in the community for his new operational axiomatic framework for Quantum Theory, which has been subject of dozens of invited talks, and recently lead to the first information-theoretic axiomatization of Quantum Theory coauthored with G. Chiribella and P. Perinotti, Very recently he opened a very promising Quantum Cellular Automata framework for Quantum Field Theory, which got numerous invited talks and colloquia, including prominent Research Labs in particle physics (Fermilab and Frascati). In his early research years D’Ariano has worked in Statistical Mechanics and phase transitions, along with exact solutions of many body quantum problems, issues that now reconnect with the Quantum Automata of the most recent work. Finally, D’Ariano has collaborated and co- published with more than sixty different scientists in dozens of different institutions worldwide. His group QUIT receives many tens of visitors each year.

INVITED STAGES, VISITING SCHOLAR, AND VISITING PROFESSOR

[m=month, w=week] Institut des Hautes Études Scientifiques of Bures-sur-Yvette, Paris(1984-3m:L.Michel); Center for Nonlinear Studies, Los Alamos, New Mexico (1987 1w: M. M. Nieto and D. Campbell); Arbeitsgruppe “Nichtklassische Strahlung” der Max-Planck-Gesellschaft an der Humboldt-Universität zu Berlin (1994 1m: H. Paul); Department of Electrical and Computer Engineering, Northwestern University, Evanston IL (1994 2m, 1995 4m, 1996 4m: H. P. Yuen; 1997 3m, 1998 2m: P. Kumar; 2000 3m, 2001 5m, 2002 4m, 2003 4m, 2004 4m, 2005 2m, 2006 1m: H. P. Yuen: since then revisiting professor regularly for one up to three months every year). Department of Physics and Astronomy, University of Missouri-Columbia (1991 2w: B. DeFacio); Department for Physics and Astronomy, University of New Mexico (1993 1w: C. Caves); Graduate School of Human Informatics, Nagoya University, Japan (1993 1w: M. Ozawa); Abteilung für Quantenphysik, Universität Ulm (1994 1w W. Schleich); Max-Planck, Munich (1995 1w: H. Walther); Friedrich Schiller University di Jena, Theoretical Physics Institute (1997 1w: D. Welsch); University of Oxford (1998 1w: A. Ekert); Department of Physics, University of Maryland at Baltimore County, (1998 1w, 1999 1w, 2000 1w: Y. Shih, M. Rubin); Department of Mathematics, University of Stuttgart (2001 1w: B. Kummerer) EURANDOM, Oberwolfach 2001 1w, Benasque (2000 3w, 2003 3w, 2005 3w), Eindhoven (2003 1w: R. Gill), Oberwolfach 2005 1w, School of Mathematical Sciences University of Nottingham (2003 1w: S. Belavkin), Tohoku University Sendai Japan (2005 1w: M. Ozawa) ERATO Tokyo (2006 1w: M. Hayashi). FOLLOWING YEARS: Regular visitor of Northwestern University IL for months/y, Sendai and Nagoya JP, and many other places (see also list of invited talks).

INSTITUTIONAL AND PROFESSIONAL SERVICE

Member of the Steering Committee of Quantum Information Theory and Quantum Computation of the European Science Foundation (1999-2002); Member of the Network of Excellence QUIPROCONE (Quantum Information Processing and Communication) (2000-); President of the Steering Committee of the International Conference on Quantum Communication, Measurement and Computing (QCM& C) (2012-); Co-Chair of the 2nd International ICST Conference on Quantum Communication and Quantum Networking (2010-); Principal Organizer: Working Conference on Quantum Measurements and Open Quantum Systems, Torino, Institute of Scientific Interchanges, 1997; II Working Party on Quantum

Optics and Quantum Computation, Scuola Normale di Pisa 1997; Workshop on: Quantum Information Processing and Quantum Communications, Pavia 2004. Member of the Organizing Committee: 6th International Conference on Quantum Communication, Measurement, and Computing, MIT, Cambridge, MA, 2002; 5th International Conference on Quantum Communication, Computing and Measurement, Chicago, 1998. Member of the Advisory Committee: Foundations of Probability and Physics-6, Vaxjo 2011; Quantum Probability, Information and Control Symposium, Nottingham 2006; 9th ICSSUR, Besancon France 2005; Wigner Centennial Conference, Pecs Hungary 2002; 7th International Conference on Squeezed States and Uncertainty Relations, Boston, MA, 2001; 6-th International Conference on "Squeezed States and Uncertainty Relations" Naples 1999; 5th International Conference on Quantum Communication, Measurement, and Computing, Capri, Italy, 2000. 7th International Conference on Quantum Communication, Measurement, and Computing, Glasgow, UK, 2004. Quantum Optics II, Cozumel in the Mexican Caribbean, 6-9 December 2004. ICSSUR Besancon, France, May 2 to 6, 2005. Member of Program Committee: subcommittee "Quantum Optics", EQEC Munich, 2003; Topical meeting on: Quantum Information and Communication, Laser Munich 2001; Topic area: Quantum Optics, CLEO/EUROPE-IQEC Nice 2000. Editorial Board Member: Open Systems & Information Dynamics, Journal of Quantum and Semiclassical Optics, (2000-2006). National Project Coordinator: (1997-98) Amplification and Detection of Quantum Information, (1999- 00) Quantum Information Transmission and Processing: Quantum Teleportation and Error Correction (2001-2002) Entanglement Assisted High Precision Measurements (2003-2005) Novel quantum measurements by parametric processes. (2005-2006) Broadcasting of Quantum Information and Cryptography. (2008-2011) Quantum Circuits Architecture. Referee: Nature, PRL, PRA-B-D, PLA, JPA-B-D, JQI, JQP, JMP, JOB, JOSAB, OL, and many others. Funded Research Projects: INFN Advanced Research Projects (PRA): (1997-00) Generation and detection of quantum mesoscopic superpositions in parametric media (CAT); (2002-) Quantum Teleportation and Quantum Cloning by the Optical Parametric Squeezing Process (CLON); INFN PAIS Projects: (1999-00) Study of correlations and state reduction in cw and pulsed parametric devices by self homodyne techniques (TWIN); Italian Ministry of University and Research Projects: (1997-98) Amplification and Detection of Quantum Information, (1999-00) Quantum Information Transmission and Processing: Quantum Teleportation and Error Correction (2001-) Entanglement Assisted High Precision Measurements (2002-2003) New Generation of Quantum Measuring Devices for Photon Quantum Information Technology (2003-2005) Novel quantum measurements by parametric processes. (2005-2006) Broadcasting of Quantum Information and Cryptography. (2008-11) Quantum Circuits Architecture. European Community: (2002-2005) Active Teleportation and Entangled State Information Technology, (2009-2012) Collective quantum operations for information technologies.

Other Collaborators: G. Amelino-Camelia, R. Renner, B. Coecke, H. P. Yuen, P. Kumar, B. Valiron, P. Mataloni, F. Sciarrino, R. Werner, D. Schlingemann, M. Keyl, D. Kretschmann, Past: F. De Martini, M. Raginski, V. P. Belavkin, R. Demkowicz-Dobrzanski, G. Cassinelli, E. De Vito, R. Gill, N. Cerf, M. Roetteler, L. Kauffman, A. Ekert, M. Mosca, W. van Dam, B. Kummerer, D. Bruß, M. Lewenstein, J. Kahn, A. Andreoni, M. Bondani, A. Leverero, A. Porzio, S. Solimeno. P. Tombesi, S. Mancini, M. Fortunato, S. L. Braunstein, G. J. Milburn, M. Rubin, Y. Shih, A. Garuccio, K. Banaszek, M. Vasilyev, V. I. Man'ko, U. Leonhardt, H. Paul, R. Schack, C. M. Caves, S. Moroni, L. R. Evangelista, M. Saraceno, B. DeFazio, R. Bonifacio, M. Rasetti, A. Montorsi, M. Vadamchino, J. Katriel, A. Solomon, L. Michel Occasional: G. A. Barbosa, C. Agnes, C. Buzano, L. Benni, C. Marchetti, S. Aldovrandi. Only coauthors: A. Sen(De), U. Sen, S.-K. Choi, M. B. Plenio, S. Bose, D. Jonathan, M. De Laurentis, H. Maassen, E. Corndorf, G. Di Giuseppe, A. Mazzei, M. Ricci, T.-G. Noh, P. Voss, A. P. Bonoldi, E. Castellaro, R. Ciapparelli, E. Cima, D. Colombo, M. Maffezzini, R. Dionigi. Continuing discussion: M. Ozawa

For more details see <http://www.qubit.it>

EDUCATION AND EMPLOYMENT HISTORY

1974 Maturità Classica, Liceo Plana, Alessandria, Italy

1978 Laurea in Physics (Solid State), summa cum Laude, University of Pavia, Italy
(Advisor: F. Borsa)

1979 Scuola di Perfezionamento in Polymer Science, Politecnico di Milano, (Advisor: A. Pavan).

1980-82 Research training: NMR, Phase transitions and Magnetic Systems, (Advisor: A. Rigamonti);

1982-84 Research Training: Statistical Mechanics, Group Theory, Integrable Systems, (Advisor: M. Rasetti)

1984-1992 Research Assistant, University of Pavia

1992-2000 Associate professor, University of Pavia

2000-Full professor, University of Pavia

2000- Group leader, QUIT (Quantum Information Theory Group), University of Pavia

2000- Member of Center for Photonic Communication and Computing, ECE Department, Northwestern University, Evanston, IL

TEACHING ACTIVITIES

Full courses: Quantum Mechanics (2011- II level Phys.), Foundations of Quantum Mechanics (2006-, II level Phys.), Physical Theory of Information (2004-, II level Phys.), Quantum Optics (2004-, I and II levels Phys.), Quantum Systems and Information (2000-2003, Laurea, Phys.), Quantum Optics (1992-1999, Laurea, Phys.), Structure of Matter (1997-98, Laurea, Phys.), Solid State Theory (1991-92, Laurea, Phys.)

Seminars: Statistical Mechanics (1984-99, Laurea, Phys.), Quantum Stochastic Methods in Quantum Optics (1990-91, PhD, Phys.), Structure of Matter: lecturer (1984-94, Laurea, Phys.), Creep Fracture in Polymer Science (1978-79, Laurea, Engineering)
Lecturer: General Physics (1983-84, Laurea, Biology), Physics Lab (1979-80, Laurea, Medicine).

International Schools: College on Representation Theory of Lie Groups, Trieste ICTP. 1985; Summer School attributed to the Memory of Prof. A. O. Barut, Ankara 1995 (two series of lectures); 6th Volterra-CIRM International School on Quantum Information: Filtering and Control, Levico Terme 2004

PHD School in Physics at the University of Pavia: Member of the Board. Teaching: Quantum Information Science, Selected Topics in Quantum Mechanics

LAUREA, PHD, AND POSTDOCTORAL SUPERVISION, CONTRACT SPONSOR

Laurea Thesis: L. Bertolini (1981/82), A. Cavalli (1984/85), G. Onida (1986-87), N. Sterpi (1986/87), R. Paoletti (1987/88), R. Simonelli (1991/92), R. Seno (1991/92), A. Zucchetti (1993/94), G. Orfino (1993/94), M. Sacchi (1994/95), L. Maccone (1995/96), M. Painsi (1997/98), M. Cinchetti (1998/99), P. Perinotti (1998/99), P. Scudo (1999/00), P. Lo Presti (1999/00), B. Falabretti (2001/02), R. Mecozzi (2001/02), F. Buscemi (2001/02), G. Chiribella (2002/03), P. Albini (2003/2004), D. Magnani (2005/2006), S. Bronzin (2004-), S. Facchini (2006/07), A. Bisio (2006/07), A. Tosini (2008/9) F. Manessi (2011/12) PhD Thesis: C. Macchiavello (1992-94), M. Paris (1992-94), R. Seno (1994-96), M. Sacchi (1996-98), L. Maccone (1997-99), P. Lo Presti (2001-03), F. Buscemi (2003-05), G. Chiribella (2004-06), G. De Cillis (2005-2004), D. Magnani (2006-2008), M. Dall'Arno (2009-) A. Tosini (2010-) F. Manessi (2012-) Postdoctoral Fellows: N. Sterpi (1994-95,97-98), M. Paris (1996-01), C. Macchiavello (1997-98), M. Sacchi (1998-01), L. Maccone (2000-01), P. Perinotti (2002-), G. Chiribella (2006-2010), A. Bisio (2010-), S. Facchini (2010-), M. Sedlak (209-). Long-term contract Sponsor: M. Sacchi (2001-2009), O. Rudolph (2001-2004), M. Keyl (2004-2005), L. Maccone (2004). Monthly contracts: K. Banaszek (1999), Th. Richter (2000), D. Schlingeman (2006)

PROFESSIONAL HONORS

Alumnus Almo Collegio Borromeo of Pavia (1974-80)
Research fellowship in Polymer Science Politecnico di Milano (1978-79)
Research fellowship at Pavia University (1979-80)
Fellow of the Optical Society of America
Member of the former Network of Excellence *QUIPROCONE*
Member of the Lombard Academy of Science and Letters
Two INFM (Istituto Nazionale Fisica della Materia) Excellences 1998
INFM Highlight 2000-01
FQXi 3rd Essay Award 2011 *Is Reality Digital or Analog?*
FQXi 3rd Essay Award 2012 *Questioning the Foundations*

INVITED TALKS OF GIACOMO MAURO D'ARIANO

FORTHCOMING

IT176 Vaxjo, June 09-14 2013, Quantum Theory: Reconsideration of Foundations - 7, TITLE TO BE DECIDED

IT175 Roma La Sapienza, 2013, Invited talk at Department of Physics, TITLE TO BE DECIDED

IT174 Innsbruck, 17-19 April 2013, Theory Colloquium, Quantum Cellular Automaton Extension to Quantum Field Theory: the Dirac field

INVITED TALKS

IT173 Nagoya Feb 18-22 2013, [The Fourth Nagoya Winter Workshop on Quantum Information, Measurement, and Foundations](#), [Quantum Cellular Automaton Extension to Quantum Field Theory: the Dirac field](#)

IT172 Torino, October 14-19, 2012 [THE TIME MACHINE FACTORY \[unspeakable, speakable\] on Time Travel - in Turin](#), Information coming from the future is a falsification of Quantum Theory

IT171 Zurich ETH, June 14, 2012, Theory Colloquium, Physics from Informational Principles

IT170 Frascati, June 20-22, 2012, [Open problems in Quantum Mechanics](#), A quantum cellular automaton extension of quantum field theory

IT169 Vaxjo, June 11-14 2012, [Quantum Theory: Reconsideration of Foundations - 6](#), Informational Principles for Physics

IT168 Torino INRIM, June 7 2012, Incontri del Giovedì 2012, La Fisica derivata da principi di Informatica

IT167 Torino INRIM, May 20-26 2012, [Quantum 2012, VI Workshop in Memoriam of Carlo Novero, "Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons"](#), Simulating Quantum Field Theory with a Quantum Computer, and the solution of the Feynman problem

IT166 Bicocca, Department of Material Science, April 19, 2012, [Lecture for PhD in Physics](#), Quantum Information: Principles and Trends

IT165 Broni, Liceo Scientifico, April 14, 2012, Lecture for last year classes, La nuova Fisica

IT164 Paris, April 4-5, 2012, LARSIM and QuPa, Foundational questions of quantum information, Physics from Informational Principles

IT163 Oxford April 26-30 2012, [Department of Computer Science, Quantum Information Sciences Workshop](#), Physics from Informational Principles

IT162 Nagoya Feb 14-18 2012, [The Third Nagoya Winter Workshop on Quantum Information, Measurement, and Foundations](#), [Physics from Principles](#)

- IT161 Montreal, Dec 6-9 2011, Quantum Foundations in the Light of Quantum Information III., Quantum Foundations: What's next?
- IT160 Oct 31 2011, Ulm Colloquium., [A Quantum-Digital Universe. Quantum Cellular Automata approach to Quantum Field Theory: a proposal](#)
- IT159 Aug 29-Sept 2 2011, Trento ECT, [Speakable in quantum mechanics: atomic, nuclear and subnuclear physics tests.](#), A Quantum Digital Universe: A QCA Approach to Field Theory [PDF](#) [MOVIE](#) [Simulation 1](#) [Simulation 2](#)
- IT158 July 11-15, Sarajevo, [20th INTERNATIONAL LASER PHYSICS WORKSHOP.](#), Quantum-Computational and Optical Simulation of the Dirac Equation
- IT157 June 12-15 2011, Linnaeus University, International Centre for Mathematical Modelling in Physics, [Foundations of Probability and Physics-6 \(FPP6\)](#), [A Quantum-Digital Universe](#)
- IT156 May 9-13 2011, Universidad Complutense de Madrid, [18th Central European Workshop on Quantum Optics](#), Quantum-Computational and Optical Simulation of the Dirac Equation.
- IT155 May 9-13 2011, Perimeter Institute, Waterloo CA, [Conceptual Foundations and Foils for Quantum Information Processing](#), A Quantum-Digital Universe
- IT154 May 5-7 2011, Accademia dei Lincei, [ENTANGLEMENT, QUANTUM INFORMATION AND THE QUANTUM-TO-CLASSICAL TRANSITION](#), [A Quantum-Digital Universe](#)
- IT153 May 3-4 2011, MIT W. M. Keck Foundation Center for Extreme Quantum Information Theory (xQIT), [xQIT Conference: Difficult Problems in Quantum Information Theory \[schedule\]](#), A Quantum-Digital Universe
- IT152 April 18 2011, Milano Bicocca, [Ciclo di incontri: I fondamenti della meccanica quantistica: implicazioni epistemologiche e problemi aperti. In un universo 'digitale' la teoria quantistica incontra la relativita' locandina](#)
- IT151 February 14-18 2011, Graduate School of Mathematical Science, Nagoya, [The Second Nagoya Winter Workshop on Quantum Information, Measurement, and Foundations.](#), [A Quantum digital Universe](#)
- IT150 January 11 2011, Albert Einstein Institute, Berlin, Physics as Information: Quantum Theory meets Relativity
- IT149 November 30 2010, Perimeter Institute, Waterloo CA, Physics as Information: Quantum Theory meets Relativity [\[ABSTRACT and Recordings\]](#)
- IT148 October 20 2010, Fermilab, Batavia, Illinois, [Fermilab Colloquium 2010-2011](#), Physics as Information Theory [PDF](#)
- IT147 September 22 2010, Istituto Nazionale di Ricerca Metrologica (INRIM), Torino, Italy, [seminario tecnico](#) Special Relativity from Quantum Theory: Simulation of Quantum Fields by a Quantum Computer as a new type of Field Theory
- IT146 September 9 2010, Laboratori Nazionali di Frascati (LNF), Frascati, Italy [seminario tecnico](#), Special Relativity from Quantum Theory: Simulation of Quantum Fields by a Quantum Computer as a new type of QFT

IT145 July 26 2010, Graduate School of Mathematical Science, Nagoya University, Japan, White Noise seminar, Special Relativity from Quantum Theory

IT144 July 19-23 2010, University of Queensland, Australia, [QCMC 20010](#), Simulation of Quantum Fields by a Quantum Computer as a new type of Field Theory

IT143 June 14-17 2010, Linnaeus University, Sweden, ["Advances in Quantum Theory"](#), On the principle of the quantumness, the quantumness of Relativity, and the computational GUT

IT142 June 8 2010, Bratislava, [Research Center for Quantum Information](#), Relativity is a consequence of Quantum Theory

IT141 June 1 2010, Cambridge, Centre for Mathematical Sciences, Simulation of Quantum Fields by a Quantum Computer as a new type of Field Theory

IT140 May 23-29 2010, Torino, I.N.R.I.M, [V workshop ad memoriam of Carlo Novero: Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons and the third Italian Quantum Information Science Conference IQIS 2010](#), A Computational Grand-Unified Theory

IT139 February 17-25, Nagoya University, Japan, "Nagoya Winter Workshop on Quantum Information, Measurement, and Foundations", On the "principle of the quantumness", the quantumness of Relativity, and the computational grand-unification, [PDF](#)

IT138 February 3, Perimeter Institute, Waterloo CA, A Computational Grand-Unified Theory [\[ABSTRACT and Recordings\]](#)

—Jan 4-30 2010, Bhubaneswar, Orissa, India [http:International](#) Program on Quantum Information, IPQI, IOP, ICTS. REGRETFULLY DECLINED

IT137 August 9-16, Perimeter Institute, Waterloo CA, Workshop on "Reconstructing Quantum Theory", Candidates for Principles of Quantumness PRESENTATION: [\[Macromedia Flash MOVIE\]](#) [\[Windows media MOVIE\]](#) [MP3 Audio](#) [Windows Video File](#) [PDF](#)

IT136 July 6-8 2009, Cambridge, Centre for Mathematical Sciences, ["Cambridge Summer Workshop on Quantum Information"](#), Seeking a Principle of Quantumness

IT135 June 14-18 2009, Vaxjo University, ["QTRF5 - Quantum Theory: Reconsiderations and Foundations 5"](#), Seeking a Principle of Quantumness

IT134 June 2 2009, Jindřichov Hradec, Czech Republic, ["6th Central European Quantum Information Processing Workshop 1-4 June 2009"](#), [The quantum comb: theory and applications to quantum networks](#)

IT133 April 8-9 2009, Oxford University ["6th QPL workshop Quantum Physics and Logic"](#), [\[video\]](#) [Toward an operational derivation of Quantum Mechanics](#) [VIDEO](#)

IT132 March 18 2009, Institute for Theoretical Physics, University of Innsbruck, ["Seminar/Theory Colloquium"](#), [The quantum comb: theory and applications to quantum networks](#)

IT131 March 5-13 2009, Graduate School of Information Science Nagoya University Chikusa-ku, Nagoya, Japan Toward an operational derivation of Quantum Mechanics

IT130 March 2-4 2009, National Institute of Informatics, Tokyo ["DEX-SMI Workshop on Quantum Statistical Inference"](#), Probabilistic theories: what is special about Quantum Mechanics?

— October 24-29, Camerino, Italy [Italian Quantum Information Science Conference 2008](#), REGRETFULLY DECLINED

IT129 October 10, Padova, Istituto di Fisica G. Galilei, [WORKSHOP ON THE FOUNDATIONS OF QUANTUM MECHANICS](#), Quantum Mechanics as a fair operational framework

— September 20-23, Vilnius, Lithuania [XII International Conference on Quantum Optics and Quantum Information 2008](#), REGRETFULLY DECLINED

IT128 September 14-20, Obergurgl, Austria, [Foundational Structures for QI & QC](#), Quantum Mechanics as a fair operational theory

IT127 September 5, Pavia, [Festival dei Saperi](#), locandine: [\[1\]](#), [\[2\]](#), Teletrasporto, [\[Dalla Provincia Pavese\] \[comunicato stampa\] \[intervista STIC mp3\]](#)

IT126 August 25 - 30, Perimeter Institute, Waterloo CA, [Workshop on "Quantum Estimation: Theory and Practice"](#), [A new approach to Quantum Estimation: Theory and Applications](#) PRESENTATION: [\[Macromedia Flash MOVIE\]](#) [\[Windows media MOVIE\]](#) [MP3 Audio](#) [Windows Video File](#) [PDF](#)

IT125 August 19 - 24, Calgary CA, [Ninth International Conference QCMC](#), A new notion in Quantum Mechanics: the Quantum Comb

— June 30 - July 4 2008, Trondheim, Norway, [Seminar on Quantum Information & Computation, LPHYS'08](#), , REGRETFULLY DECLINED

IT124 June 4-7 2007, Perimeter Institute, Waterloo, Canada, ["Osamu Hirota, A True Quantum Communications Channel"](#), Why Quantum? PRESENTATION: [\[Macromedia Flash MOVIE\]](#) [\[Windows media MOVIE\]](#) [MP3 Audio](#) [PDF](#)

— June 25-28 2008, Torun, Poland, [40th Symposium on Math. Phy. "GEOMETRY AND QUANTA"](#), REGRETFULLY DECLINED FOR SUPERPOSITION WITH R125

IT123 May 19-23 2008, Torino, I.N.R.I.M, [Quantum 2008: IV workshop ad memoriam of Carlo Novero, Advances in Foundations of Quantum Mechanics and Quantum Information with Atoms and Photons](#), Probabilistic Operational theories: what is special about Quantum Mechanics

IT122 May 13-17 2008, Zurich, ETH, [Information primitives and laws of nature](#), Probabilistic Operational theories: what is special about Quantum Mechanics

IT121 March 27 2008, Milano, Universita' Bicocca, [Quantum Computing Workshop, Quantum Circuits Architecture](#)

— March 4-12, Bhubaneswa, India, [International School and Conference on Quantum Information \(ISCQI - 2008\)](#), REGRETFULLY DECLINED

IT120 Feb 15-17 2008, Santa Fe New Mexico, [SQuInT" 10th Annual Meeting of the Southwest Quantum Information and Technology \(SQuInT\) Network"](#), Quantum Circuit Architecture

IT119 Dec. 10 2007, Massachusset Institute of Technology, Boston US, QIP seminar: ["Quantum Information Seminars"](#), Quantum Circuit Architecture [MIT abstract](#) [Windows Media Movie coming soon](#)

IT118 November 4-10 2007, E. Majorana Centre, Erice, Italy, "[Noise, Information and Complexity at Quantum Scale](#)", [Quantum Circuits Architectures for Processing Quantum Operations](#)

IT117 July 1-13 2007, Cambridge University, Great Britain, "[Operational probabilistic theories as foils to quantum theory](#)", [Mathematical structures of Quantum Mechanics and connections to operational principles](#)

IT116 June 11-16 2007, Vaxjo University, [\[Quantum Quandaries BLOG\]](#) [\[PRESS\]](#) Mathematical structures of Quantum Mechanics and connections to operational principles

IT115 June 4-7 2007, Perimeter Institute, Waterloo, Canada, "[Operational Quantum Physics and the Quantum-Classical Contrast](#)", Mathematical structures of Quantum Mechanics and connections to operational principles PRESENTATION: [\[Macromedia Flash MOVIE\]](#) [\[Windows media MOVIE\]](#) [MP3 Audio PDF](#)

— June 20-24 2007, Budmerice, Slovakia, "[Identifying quantum states and operations: theory and applications](#)", REGRETFULLY DECLINED

— June 5-8 2007, Valtice, Czech Republic, "[5th Central European Quantum Information Processing Workshop 5-8 June 2008, Telc, Czech Republic](#)", REGRETFULLY DECLINED

IT114 May 25 2007, Pavia University, "[Quantum bionet](#)", Operational axioms for Quantum Mechanics

IT113 March 22 2007, Sendai, Tohoku University, Optimal data processing of quantum measurements

IT112 March 20 2007, Sendai, Tohoku University, Where the mathematical structure of Quantum Mechanics comes from?

IT111 February 15, Universita` di Pavia "[Progetto lauree scientifiche](#)", [\[TALKS\]](#) Il Calcolatore Quantistico: il Computer del futuro?

IT110 February 1 2007, Siena, Dipartimento di Matematica, Il Calcolatore Quantistico: il Computer del futuro? (Recensioni: [\[1\]](#) [\[2\]](#) [\[3\]](#) [\[4\]](#) [\[5\]](#) [\[6\]](#) [\[7\]](#) [\[8\]](#) [\[9\]](#) [\[10\]](#) [\[11\]](#) [\[12\]](#) [\[13\]](#) [\[14\]](#))

IT109 December 5 2006, Tokyo, Daini Hongo White Bldg. 201 5-28-3, Hongo, Bunkyo-ku Tokyo 113-0033 "[ERATO-SORST Quantum Computation and Information Project, Japan Science and Technology Agency](#)", [Operational Axioms for Quantum Mechanics](#)

IT108 28 November -3 December 2006, Tsukuba, "[QCMC2006](#)", [How to derive Hilbert Space Formulation of Quantum MEchanics from axioms on experimental accessibility and simplicity](#)

IT107 November 23 2006, Milano, Dipartimento di Informatica, Sistemistica e Comunicazione, universita' degli Studi di Milano-Bicocca, "[IL PARADIGMA COMPUTAZIONALE, III](#)", [\[1\]](#)[\[2\]](#)[\[BLOG\]](#) Assiomi operazionali per la meccanica quantistica

IT106 July 17-22 2006, Nottingham, "[Quantum Probability and its Applications 27](#)", How to Derive the Hilbert-Space Formulation of Quantum Mechanics From Purely Operational Axioms

IT105 June 22 2006, Trieste SISSA, "Theory and Technology in Quantum Information, Communication, Computation and Cryptography", Hilbert-Space Formulation of Quantum Mechanics From Purely Operational Axioms

IT104 June 7 2006, International Centre for Mathematical Modelling in Physics, Engineering and Cognitive Sciences, Vaxjo University, Sweden, Foundations of Probability and Physics 4, [Quantum Theory: Reconsideration of Foundations 3](#), How to Derive the Hilbert Space Formulation of Quantum Mechanics from Purely Operational Axioms

IT103 June 4 2006, Institute of Physics, N. Copernicus University, Torun, Poland, XXXVIII Symposium on Mathematical Physics, [Quantum Entanglement & Geometry](#), [\[PHOTOS\]\[PRESS\]](#) How to Derive the Hilbert Space Formulation of Quantum Mechanics from Purely Operational Axioms

IT102 June 2, Leiden, Lorentz Center, [Beyond the Quantum](#), How to Derive the Hilbert Space Formulation of Quantum Mechanics from Operational Axioms

IT101 May 5, Torino, I.N.R.I.M, Quantum 2006: III workshop ad memoriam of Carlo Novero, [Advances in Foundations of Quantum Mechanics and Quantum Information with Atoms and Photons](#), Quantum Mechanics from Purely Operational Axioms

IT100 November 29 2005, Sendai, Tohoku University, QI meeting, Lecture on GNS and Choi Jamiolkowski representations, channel and POVM tomography, channel discrimination, covariant channels

IT99 November 25 2005, Sendai, Tohoku University, [The 13th Quantum Information Technology Symposium \(QIT13\)](#), Broadcasting Quantum Information

IT98 November 18-19 2005, Copenhagen, Royal Danish Academy of Sciences and Letters, [Symposium on Quantum Information](#), [Broadcasting Quantum Information](#)

IT97 November 16 2005, Milano, Dipartimento di Scienze Umane per la Formazione "R. Massa", Universita' di Milano-Bicocca [Il paradigma computazionale e i modelli della razionalita'](#), [\[PRESS\]](#) Una rifondazione operativa della Meccanica Quantistica

IT96 November 9 2005, University of Illinois at Urbana-Champaign, [Quantum Information Science Seminar](#), Broadcasting Quantum Information

IT95 October 25 2005, Chicago, University of Illinois, Broadcasting Quantum Information

IT94 September 29 2005, Dresden, MPIPKS, [International School of Quantum Information 2005](#), [Programmability of measurements and channels](#)

IT93 September 20 2005, Dresden, MPIPKS, [International School of Quantum Information 2005](#), EXTRA I - (Some) Open quantum problems

IT92 September 4-10 2005, Trieste-Losinj, [On the present status of Quantum Mechanics](#), [Quantum Mechanics as the "syntactic manual" for the experiment](#)

IT91 July 18-20 2005, Torino ISI, [TOPQIP Miniworkshop](#), New problems in quantum measurements and processings

IT90 June 23 2005, Benasque, [Workshop on Quantum Informations](#), New problems in quantum measurements and processings

IT89 June 11-15 2005, New York City, [Discrete tomography and its applications](#) Quantum Tomography for Imaging, [paper](#), Conference papers: [\[EJDM\]](#)

IT88 June 6-11 2005, Vaxjo, Sweden, [Quantum Theory: reconsideration of foundations-3](#) On the missing axiom of Quantum Mechanics [paper](#)

IT87 May 6 2005, Lecce, Grand Hotel Tiziano, [Quantum Mechanics and Quantum Information New Devices for retrieving and broadcasting Quantum Information](#)

IT86 May 3 2005, Torino, IEN Galileo Ferraris, [L'eredita' di Einstein: alcuni recenti progressi](#), [PRESS] [Recenti sviluppi della meccanica quantistica: dalla tomografia quantistica alla caratterizzazione dei rivelatori quantistici](#)

IT85 April 13 2005, Modena, Dipartimento di Matematica, ["Matematici e Filosofi si incontrano"](#): [PRESS] [Evoluzione del concetto di computabilita' , Il quantum computer](#)

IT84 March 18-20 2005, Vietri, Hotel Baia, ["Meccanica Quantistica e Computazione Quantistica"](#), [New Devices for retrieving and broadcasting Quantum Information](#)

IT83 February 21th 2005, Levico Terme, Grand Hotel Bellavista, ["26th Conference: Quantum Probability and Infinite Dimensional Analysis"](#), [Mappings between the Convex Structures of States, POVM's and Channels, and their physical meaning](#) EXTENDED ABSTRACT

IT82 January 26th 2005, Oberwolfach, [Mathematisches Forschungsinstitut](#), [Meeting: Entanglement and Decoherence: Mathematics and Physics of Quantum Information and Computation](#) [annual report][Quantum Convex Structures and their Physical Interrelations](#) EXTENDED ABSTRACT

IT81 December 9th 2004, Cozumel, Mexico, [Quantum Optics II](#), [Engineering Novel Quantum Information Processing Devices](#)

IT80 December 1th 2004, Salice Terme, [Aspetti di storia della fisica dagli anni trenta al secondo dopoguerra](#) [PRESS], [Casualita' di natura ontica o epistemica? Riflessioni sulla Meccanica Quantistica](#)

IT79 November 15th 2004, Newton Institute, Cambridge, [Workshop on Quantum Statistics](#), [Convex Structures in Quantum Mechanics and their Physical Interrelations](#)

IT78 October 16th 2004, Istituto Stensen, Firenze, [HOMO CYBER](#), [Ilocandina](#)(Press: [\[1\]](#)[\[2\]](#))[BLOG](#) Hardware: verso quale futuro? Il processore quantico

IT77 August 21 2004, University of Maryland, [Second Feynman Festival](#), [Informationally complete quantum measurements](#)

IT76 July 5 2004, Levico terme, [6th Volterra-CIRM International School on Quantum Information: Filtering and Control](#), [Optimization in the design of quantum experiments. Lecture I: Quantum Tomographic Calibration of Quantum Operations and POVM's](#)

IT75 April 26 2004, Torino, IEN Galileo Ferraris, [2nd Workshop ad memoriam of Carlo Novero](#), [Advances in Foundations of Quantum Mechanics and Quantum Information with atom and photons](#), [Informationally complete measurements and universal detectors](#)

IT74 17 December 2003, School of Mathematical Sciences, University of Nottingham, [Universal Measuring Devices and Quantum Calibration](#)

IT73 27 November 2003, Milano, Istituto Lombardo Accademia di Scienze e Lettere, [Quantum Calibration](#)

IT72 [August 11th 2003, Aarhus, Quantum Measurements and Quantum Stochastics](#), [\[guest list\]Universal and programmable measuring devices, and quantum calibration](#)

IT71 July 2 2003, [Benasque, Spain, Quantum Information](#), Universal Observables

IT70 June 9th-13th 2003, Puebla, Mexico, ICSSUR 8th, [Characterization and Engineering of Quantum Operations](#)

IT69 May 19th 2003, Torino, IEN Galileo Ferraris, Characterization and Engineering of Quantum Detectors and Processors

IT68 April 29th 2003, Roma La Sapienza, Caratterizzazione e realizzazione di operazioni quantistiche — April 11-14 2003, Aix en Provence [Continuous Variables Quantum Information Processing 2003 Workshop](#), REGRETFULLY DECLINED

IT67 April 3rd 2003, Milano, Liceo Scientifico Leonardo da Vinci, Meccanica Quantistica e Computer del futuro.

IT66 March 20th 2003, [Erice, ESF conference on ADVANCES IN QUANTUM INFORMATION PROCESSING: FROM THEORY TO EXPERIMENTS](#), Characterization and Engineering of Quantum Operations

IT65 February 6th 2003, Eindhoven, Eurandom, [Discrimination between quantum channels](#)

IT64 February 5th 2003, Utrecht, University, [Information on Quantum Devices](#)

IT63 September 2002, Dublin, QIPROCON, [3RD EUROPEAN QIPC WORKSHOP](#), [\[ABSTRACT\] Quantum information encoded on Quantum Operations](#)

IT62 July 2002, [Boston QCM&C](#), [The Quantum Bit Commitment: a complete classification of protocols](#)

IT61, May 16th 2002 Raubichi Belarus, QEC 2002, Using Entanglement Improves the Precision of Quantum Measurements

IT60 March 12th 2002, Trieste, Quantum Interferometry, On the Heisenberg ``principle''

IT59 March 22th 2002, Fai della Paganella, [convegno annuale della sezione teorica](#), Using Entanglement Improves the Precision of Quantum Measurements

IT58 February 27th 2002, Roma, Università la Sapienza, Dipartimento di Fisica Entanglement per tomografia e misurazioni quantistiche

IT57 January 26th-February 1st 2002, Dresden, [Qrandom II](#), Universal Quantum Estimation

IT56 June 17-27th 2001, Varenna, [Scuola ``E. Fermi''](#), [Tomographic Methods for Universal Estimation in Quantum Optics](#)

IT55 June 4-8th 2001, Boston, ICSSUR, Quantum Tomography and Quantum Holography: Toward a Quantum CAD for Universal Estimation

- IT54 March 11-17th 2001, Oberwolfach, [Stochastics in the Sciences](#), Tomographic Methods for Quantum Estimation
- IT53 March 8th 2001, Stuttgart, Department of Mathematics, Quantum Tomography
- IT52 February 12-16th 2001, Eindhoven, Netherlands, [Qrandom \[PRESS\]](#), Tomographic Methods for Quantum Estimation
- IT51 January 20-25th 2001, Levico, [Quantum Probability](#), Latest developments in Quantum Tomography
- IT50 October 6-11th 2000, Palermo, [LXXXVI Congresso Nazionale della Società Italiana di Fisica, Malintesi diffusi sul principio di indeterminazione di Heisenberg](#)
- IT49 July 3-8th 2000, Capri, Italy, [Fifth International Conference on Quantum Communication Measurement & Computing](#), Quantum Tomography, Entanglement, and Teleportation
- IT48 April 28th-May 11th 2000, Balatonfured, Hungary, [Seventh Central-European Workshop on Quantum Optics](#), Informative and Noninformative Measurements: Tomography and Teleportation
- IT47 1999 Pavia, Università della Terza età, Lezioni Divulgative: October 26th L'Atomo; December 21th La Meccanica Quantistica
- IT46 November 10th 1999, Roma, Università La Sapienza, Nuove Misure in Meccanica Quantistica
- IT45 September 26th-October 1st 1999, Santa Clara CA, Optical Society of America annual meeting, Symposium on "Quantum State Tomography", Quantum optical tomography: general approaches and methods
- IT44 September 23th 1999, Pavia, Congresso della Società Italiana di Fisica, Quantum computers
- IT43 August 9-13th 1999, Baltimore MD, Fundamental Problems in Quantum Theory Workshop, Quantum Tomography for General Dynamical systems
- IT42 July 15th 1999, Cambridge, Newton Institute, Workshop: "Entanglement and Quantum Information Processing", Quantum Tomography for Arbitrary Quantum System
- IT41 May 24-29th 1999, Napoli, Sixth International Conference on Squeezed States and Uncertainty Relations, Quantum Tomography: New Experiments and Methods
- IT40 April 30th-May 3rd 1999, Chudobin, 6th Central-European Workshop on Quantum Optics, Chudobin, Czech Republic, Group Thoeretical Tomography
- IT39 March 17th 1999, Palermo, Dipartimento di Fisica, Tomografia di stati quantistici
- IT38 March 11th 1999, Pavia, Collegio Santa Caterina da Siena, La Matematica, il Calcolatore e la Natura, Nuova informatica e Nuovi Calcolatori Quantistici
- IT37 March 1-5th 1999, Trieste, Quantum interferometry III, New Experiments in Quantum Tomography
- IT36 February 18-23th 1999, Levico, [Infinite Dimensional Analysis and Quantum Probability](#), Measuring the Quantum State and Universal Detection

IT35 December 17th 1998, Baltimore MD, University of Maryland at Baltimore County, Department of Physics, Multimode tomography

IT34 December 9th 1998, Firenze, Istituto Nazionale di Ottica, Arcetri. Long seminar on: Tomografia quantistica omodina

IT33 November 18th 1998, Milano, Istituto Lombardo Accademia di Scienze e Lettere, Ciclo di Conferenze su Scienza e Tecnologie Avanzate, [Ottica Quantistica: Applicazioni e Nuovi Esperimenti Fondamentali](#)

IT32 November 4th 1998, Pavia, Seminario generale: Teletrasporto?

IT31 September 14th 1998, Ames (Iowa), Colloquium Ames Labs, Measuring the Quantum State

IT30 August 25th 1998, Evanston IL, International Conference on Quantum Communication, Computing and Measurement, [QCM'98](#), Latest developemets in Quantum Tomography

IT29 April 15th 1998, Camerino, Quantum tomography: theory and applications

IT28 March 5th 1998, Pavia, Collegio Nuovo, Nuove Frontiere della Fisica, Relazione alla Tavola rotonda su Ottica Quantistica: teletrasporto e crittografia

IT27 February 24th 1998, Bristol, HP Laboratory, Quantum tomography: theory and applications

IT26 December 18th 1997, Jena, Friedrich Schiller University, Theoretical Physics Institute, Quantum tomography: theory and applications

IT25 October 29th 1997, Como, Congresso del Centenario, Il meccano quantistico

IT24 September 30th 1997, Evanston IL, Department of Electrical and Computer Engineering, Northwestern University, Tutorial talk on Quantum Tomography and two-mode selfhomodyne tomography

IT23 August 4-7th 1997, Baltimore MD, Fundamental Problems in Quantum Theory Workshop, Measuring Hamiltonians

IT22 May 27-31th 1997, Balatonfured, 5th International Conference on Squeezed States and Uncertainty Relations, Quantum Tomography: Theory, Simulations, and Experiments

IT21 September 25-30th 1996, Mt. Fuji-Hakone (Giappone), Sizuoka Prefecture, Third International Workshop on Quantum Communication and Measurement, Homodyning as Universal Detection

IT20 April 30th 1996, Roma, Università di Roma la Sapienza, Dipartimento di Fisica, Sulla misurabilità dello stato quantistico

IT19 March 4-8th 1996, Trieste, Quantum Interferometry II, Measuring Quantum States

IT18 1995, Fai della Paganella, Convegno annuale di fisica teorica del INFN, Relazione introduttiva del chairman della sessione di Ottica Quantistica e Chaos

IT17 1995, Pavia, Collegio Ghislieri, Relazione introduttiva del chairman su Wavelets

IT16 July 2-10th 1995, Ankara, Bilkent University, Summer School attributed to the Memory of Prof. A. O. Barut, Ciclo di lezioni su Quantum tomography

IT15 July 2-10th 1995, Ankara, Bilkent University, Summer School attributed to the Memory of Prof. A. O. Barut, Ciclo di lezioni su Quantum detection and estimation theory

IT14 1995, Munich, Max Planck, Quantum and classical tomography

IT13 January 28th-February 4th 1995, Corvara, Workshop EC Network "Non-Classical Light", Optical tomographic measurement of the density matrix

IT12 January 27th 1995, Camerino, Workshop on Quantum Tomography, Tomographic detection of the density matrix

IT11 1994, Berlin, Max Planck, Quantum Tomography

IT10 1994, Ulm, SimposiUlm in memoriam of Hans Risken, Detection of the Density Matrix through Optical Homodyne Tomography: Sensitivity for Number, Phase and Quadrature of the detected field

IT9 1993, Nagoya, Department of Physics, Quantum Estimation Theory: applications in Quantum Optics

IT8 1993, Nagoya, Graduate School of Human Informatics, Generalized Measurements and Information Channels in Quantum Optics

IT7 1993, Baltimore MD, Workshop on Squeezed States and Uncertainty Relations, Homodyning and heterodyning the quantum phase

IT6 november 20th 1992, Milano, Seminari del Dipartimento di Fisica, Amplification of photons.

IT5 October 5 1992, Pavia, Convegno SIF, Amplificatori di fotoni

IT4 September 11th 1992, Trieste ICTP, LAMP seminar, Quantum Amplification of Light

IT3 1990, Fai della Paganella, Convegno annuale di fisica teorica del GNSM, Production of fock states

IT2 1985, Polistena, Convegno del settore Proprietà collettive dei Sistemi Fisici del GNSM, Nuovi stati coerenti squeezed

IT1 1981, Pisa, Convegno del settore Proprietà magnetiche degli stati aggregati del GNSM, Studio NMR dell'ordinamento antiferromagnetico nei magneti diluiti $\text{KMnF}_3:\text{Mg}$

OTHER RELEVANT UNINVITED TALKS

T4 March 28 2011, Boston, March Meeting, Solution of the Feynman problem

T3 March 22 2011, Dallas, March Meeting, Physics as Information

T2 Dec 16 2010, Milano, Istituto Lombardo Accademia di Scienze e Lettere, Adunanza dei soci, Memoria: Fisica come informazione: à^{TM} universo $\tilde{\text{A}}$ un grande computer quantistico

T1 Jan 31 2008, Milano, Istituto Lombardo Accademia di Scienze e Lettere, Adunanza dei soci, Memoria:

[Da quali principi discende la Meccanica Quantistica?](#)