

RESUME

JUAN IGNACIO CIRAC

Personal Data

PLACE AND DATE OF BIRTH: Manresa (Spain), October 11, 1965
NATIONALITY: Spanish
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Education

July 1991 Ph. D. in Physics, Universidad Complutense de Madrid
June 1988 Licenciado (graduate) in Theoretical Physics, Universidad Complutense de Madrid

Fields of Specialization

Theoretical Quantum Optics, Quantum Information, Degenerate Quantum Gases.

Professional Experience

Since 2002 "Honorarprofessor", Technical University of Munich (Department of Physics).
Since 2001 Director of the Theory Division, Max-Planck Institut für Quantenoptik, and member of the Max-Planck Society.
1996 – 2001 Professor, Institut für Theoretische Physik, Leopold Franzens Universität Innsbruck.
1993 – 1994 Research Associate, Joint Institute for Laboratory Astrophysics, University of Colorado
1991 – 1996 "Profesor Titular de Universidad", Departamento de Física Aplicada, Universidad de Castilla-La Mancha.
1989 – 1991 Fellow "Formación del Personal Investigador" (Prog. General), Departamento de Óptica, Universidad Complutense de Madrid.

Professional Activities

2000-2003 Associate Editor, Physical Review A
Since 2001 Founding Managing Editor, Quantum Information and Computation
2002-2005 Associate Editor, Revista Española de Física
Since 2005 Associate Editor, Review of Modern Physics
2005 - 2008 Member of the International Advisory Board QIP IRC, EPSRC, United Kingdom

2005 - 2008	Member of the Kuratorium IQOQI, Austrian Academy of Sciences
Since 2007	Member of the Advisory Board ITAMP, Harvard University
Since 2007	Member of the CIAR Review Panel, Toronto, Canada
Since 2007	Member of the xQIT Visiting Committee, MIT
Since 2007	Member of the Scientific Advisory Board, Centre of Quantum Technology, NUS, Singapore
Since 2008	Member of Consejo Rector, Consejo Superior de Investigaciones Científicas
Since 2008	Member of the Advisory Board Centro de Ciencias de Benasque

Awards and Honors

2010	Premi Nacional de Pensament i Cultura Científica
2010	Benjamin Franklin Medal
2009	BBVA Foundation Frontiers of Knowledge Award
2009	Carl Zeiss-Research Award
2009	“Premios de las artes y de la ciencia” - Castellano-Manchegos del Mundo, Junta Castilla-La Mancha
2009	Distinguished Research Chair at Perimeter Institute, Waterloo, Ontario, Canada
2007	"Académico de Honor" de la Academia de Ciencias de la Región de Murcia
2007	National "Blas Cabrera" Prize for Physical, Material and Earth Sciences
2007	“Doctor Honoris Causa”, Universidad Politecnica de Catalunya (Barcelona)
2006	6 th International Quantum Communication Award
2006	Prince of Asturias Award for Technical and Scientific Research
2005	“Doctor Honoris Causa”, Universidad Castilla-La Mancha
2005	Quantum Electronics Prize of the European Science Foundation
2003	Distinguished Guest Professor, Institut de Ciències Fotòniques (Barcelona)
2003	Corresponding member of the Austrian Academy of Sciences
2002	Corresponding member of the Spanish Academy of Sciences
2002	Fellow of the American Physical Society
2002	Medal of the Royal Physical Society of Spain
2001	Felix Kuschenitz Preis of the Austrian Academy of Sciences
1992	Premio Nacional a Investigadores Noveles of the Royal Physical Society of Spain

Research Visits

1. Institute for Theoretical Physics, University of Innsbruck, 2 September to 23 November 1990.
2. Joint Institute for Laboratory Astrophysics, University of Colorado, 18 July to 30 September 1991.
3. Joint Institute for Laboratory Astrophysics, University of Colorado, 1 July to 18 September 1992.
4. Institute for Laser Physics, University of Hamburg, 30 November to 10 December 1992.
5. Joint Institute for Laboratory Astrophysics, University of Colorado, 15 June 1993 to 1 February 1994.
6. Joint Institute for Laboratory Astrophysics, University of Colorado, 25 June to 15 August 1994.
7. Institute for Theoretical Atomic and Molecular Physics, Harvard Univ., 15 August to 15 September 1994.
8. Institute for Theoretical Physics, University of Innsbruck, 10 October 1994 to 5 February 1995.
9. Centre d' Études Nucléaires de Saclay, 7 July 1995 to 7 August 1995.
10. Institut für Theoretische Physik, University of Innsbruck, 1 October to 23 December 1995.
11. Victoria University, Wellington, 27 January 1996 to 17 February 1996.
12. Institute for Theoretical Physics, University of Innsbruck, 20 March to 25 March 1996.
13. Centre d' Études Nucléaires de Saclay, 7 April to 14 April 1996.
14. Institute for Theoretical Physics, University of California in Santa Barbara, 1 October to 31 October 1996.
15. Clarendon Laboratory, Oxford University, 9 September to 15 September 1997.
16. Institute for Theoretical Physics, University of California in Santa Barbara, 2 February to 26 February 1998.
17. Clarendon Laboratory, Oxford University, 10 November to 15 November 1998.
18. Benasque Center for Physics, 9 July to 23 July 1999.
19. University Autónoma of Madrid, 26 August to 9 September 1999.
20. University of Hannover, 11 February to 27 February 2000.
21. University of Bristol, 20 May to 26 May 2000.
22. National Institute Standards and Technology (Gaithersburg), 3 March to 10 March 2001.
23. Institute for Theoretical Atomic and Molecular Physics, Harvard Univ., 10 March to 17 March 2001.
24. Joint Institute for Laboratory Astrophysics, University of Colorado, 6 February to 10 February 2002.
25. California Institute of Technology, 24 May to 28 May 2002.
26. University of Paris, Orsay, 15 December to 20 December 2003.
27. Harvard University and MIT, 3 April to 7 April 2004.

28. Institute for Theoretical Physics, University of Santa Barbara, 5 May to 28 May 2004.
29. Harvard University, 7 February to 10 February 2005.
30. Institut de Ciències Fotòniques, Barcelona, 23 April to 30 April 2006
31. Institut de Ciències Fotòniques, Barcelona, 17 July to 21 July 2006
32. Institut de Ciències Fotòniques, Barcelona, 04 December to 10 December 2006
33. Institut de Ciències Fotòniques, Barcelona, 05 March to 09 March 2007
34. Institut de Ciències Fotòniques, Barcelona, 18 July to 22 July 2007
35. Eidgenössische Technische Hochschule (ETH), Zürich, 10. January to 11. January 2008
36. Erwin Schrodinger Institute, Vienna, 16. January to 18. January 2008
37. Institut de Ciències Fotòniques, Barcelona, 09. March to 16. March 2008
38. Institut de Ciències Fotòniques, Barcelona, 25. March to 26. March 2008
39. Institut de Ciències Fotòniques, Barcelona, 23. May 2008
40. Centre for Quantum Technologies, University of Singapore, 9 September to 13 September 2008
41. University of Vienna, 18 December to 19 December 2008
42. University of Toronto, 1 February to 8 February 2009
43. Universidad Complutense de Madrid, 23 February – 24 February & 26 February to 27 February 2009
44. Institut de Ciències Fotòniques, Barcelona, 6 March to 14 March 2009
45. Institut de Ciències Fotòniques, Barcelona, 11 March to 12 March 2009
46. Centre for Quantum Technologies, University of Singapore, 24 August to 27 August 2009
47. Perimeter Institute, Waterloo/Ontario, 3 October to 23 October 2009
48. Institut de Ciències Fotòniques, Barcelona, 2 November to 6 November 2009
49. Kavli Institute for Theoretical Physics, University of California, Santa Barbara (USA), 30 November to 10 December 2009
50. Perimeter Institute, Waterloo/Ontario (Canada), 24 May to 29 May 2010

Invited Presentations at Conferences and Workshops

1. *Non-classical states of motion in an ion trap*, Workshop on Fundamentals of Quantum Optics III, Innsbruck (Austria), March 1993.
2. *Squeezed states of motion in an ion trap*, Optical Society of America Annual Meeting 93, Toronto (Canada), October 1993.

3. *Quantum statistical properties of a laser cooled ideal gas*, Workshop on Quantum field theory of cold atoms, Boulder (Colorado), July 1994.
4. *Qubits and ions*, Workshop on Quantum Computation, Torino (Italy), October 1994.
5. *Quantum statistics of a laser cooled ideal gas*, Workshop on Theoretical Quantum Optics, Munich (Germany), November 1994.
6. *Quantum Computations with cold trapped ions*, Dynamics of simple quantum systems; atoms, molecules and heterostructures, Sandbjerg (Denmark), May 1995.
7. *Quantum Computations with cold trapped ions*, Workshop on Quantum Computation and Quantum Optics, Pisa (Italy), June 1995.
8. *Quantum Computations with cold trapped ions*, Workshop on Quantum Computation, Torino (Italy), June 1995.
9. *Quantum computations with cold trapped ions*, XXXI Rencontres Moriond, Les Arcs (France), January 1996.
10. *Quantum mechanics with trapped ions*, Quantum Optics satellite meeting, Queensland (Australia), July 1996.
11. *Quantum computing and error correction schemes*, International Conference on Quantum Electronics, Sydney (Australia), July 1996.
12. *Quantum mechanics with trapped ions*, Fundamental Problems in Quantum Mechanics, Oviedo (Spain), July 1996.
13. *Quantum computing with trapped ions*, European Physical Society meeting, Sevilla (Spain), September 1996.
14. *Quantum Computers and Quantum Networks*, V International Conference on Squeezed States and Uncertainty Relations (Plenary), Balatonfured (Hungary), May 1997.
15. *Communication in a quantum network: a quantum optical implementation*, Workshop on Quantum Optics and Quantum Computation, Pisa (Italy), June 1997.
16. *Quantum communication between distant nodes in a quantum network*, Gordon Conference on Atomic Physics, New Hampshire (USA), June 1997.
17. *Manipulation of condensates with lasers*, Bose Einstein Condensation, Castelvecchio (Italy), July 1997.
18. *Transmission of quantum information in a quantum network: a quantum optical implementation*, Fundamental Problems in Quantum Theory Workshop, Baltimore (USA), August 1997.
19. *Quantum Computations with "hot" trapped ions*, Experimental Realizations of Quantum Logic, Cambridge (USA), August 1997.
20. *Quantum Communication and Computation*, V Reunión Nacional de Optica, Valencia (Spain), September 1997.
21. *Quantum Communication and Computation*, Física Estadística 97, Madrid (Spain), September 1997.
22. *Quantum Computations with Trapped Ions I: Theory*, Tutorial Workshop on Quantum Information, Almagro (Spain), October 1997.
23. *Creation of Dark Solitons and Vortices in BECs*, Workshop on Quantum Gases, Konstanz (Germany), June 1998.
24. *Quantum Communication and Computation*, XVI International Conference on Atomic Physics, Windsor (Canada), August 1998.
25. *Error Correction and Fault Tolerant Quantum Computing*, Quantum Computing Pathfinder Conference, Helsinki (Finland), September 1998.
26. *Quantum Information and Communication*, Physikertagung der deutschen physikalischen Gesellschaft 1999, Heidelberg (Germany), March 1999.

27. *Quantum computing with trapped atoms*, American Physical Society Centennial Meeting, Atlanta (USA), March 1999.
28. *Quantum optical implementations for quantum information*, 14th International Conference on Laser Spectroscopy, Innsbruck (Austria), June 1999.
29. *Quantum computation and communication*, International Conference of the EGAS 31, Marseille (France), July 1999.
30. *Quantum Information Processing with Quantum Optical Systems*, 49. Jahrestagung der Österreichischen Physikalischen Gesellschaft, September 1999.
31. *Quantum information processing with quantum optical systems*, Quantum Optics X, Palma de Mallorca (Spain), October 1999.
32. *Entanglement of Gaussian optical beams*, Workshop on Quantum Control and Information, Nof Genossar (Israel), November 1999.
33. *Quantum Communication and Computation*, 100 years of Quantum Mechanics, Museo de la Ciencia de Barcelona (Spain), March 2000.
34. *Multi-atom entangled states*, TMR-Network "The physics of quantum information" meeting, Vienna (Austria) September 2000.
35. *Quantum information processing with multi-level systems*, International workshop on mysteries, puzzles, and paradoxes in Quantum Mechanics, Gargano in Garda (Italy), September 2000.
36. *El futuro de la computación cuántica*, International conference "la ciencia y la tecnología ante el nuevo milenio", CSIC Madrid (Spain), November 2000.
37. *Multiparticle entanglement*, Workshop of the A2 Konsortium, Hannover (Germany), February 2001.
38. *Multiparticle entanglement with Bose-Einstein condensates*, Workshop on solid state quantum computing, Warsaw (Poland), April 2001.
39. *Recent developments in quantum information theory*, 4th Annual Workshop on Resonances and Time Asymmetric Quantum Theory, Jaca (Spain), May 2001.
40. *Quantum repeaters with atomic ensembles*, International conference on Quantum Information, Rochester (USA), June 2001.
41. *Quantum repeaters with atomic ensembles*, Quantum Optics V, Zakopane (Poland), June 2001.
42. *Quantum repeaters with atomic ensembles*, Workshop on Quantum Computers and Quantum Chaos, Como (Italy), June 2001.
43. *Separability and distillability properties of Gaussian states*, Second ESF QIT Conference Quantum Information: Theory, Experiment, and Perspectives, Gdansk (Poland), July 2001.
44. *Separability and distillability properties of Gaussian states*, ESF Workshop on Quantum Information and Spacetime Structure, Madrid (Spain), September 2001.
45. *Separability and distillability*, Workshop on Quantum Challenges 2001, Essen (Germany), September 2001.
46. *Quantum Entanglement: Theory and Applications*, XXVIII Reunion Bienal de la RSEF, Sevilla (Spain), September 2001.
47. *Multiparticle Entanglement*, Quantum Optics XII, San Feliu de Guixols (Spain), October 2001.
48. *Quantum repeaters based on atomic ensembles*, QIPC Workshop, Torino (Italy), October 2001.

49. *Towards quantum information processing with quantum optical systems I and II*, Workshop on Quantum Computation, Seoul (Korea), November 2001.
50. *Towards quantum information processing with quantum optical system*, International Workshop on Quantum Computation and Quantum Optics, Pohang (Korea), November 2001.
51. *Quantum repeaters with atomic ensembles*, XII Solvay Conference in Physics, Delphi (Greece), November 2001.
52. *Strongly correlated systems and BEC*, Ringberg Meeting, Ringberg Schloss (Germany), December 2001.
53. *Entanglement in quantum optical systems*, Workshop on the future of quantum information, École Normal Supérieur, Paris (France), December 2001.
54. *Entanglement with atomic systems*, Kolloquium DFG Schwerpunkt Quanteninformationsverarbeitung, Bad Honnef (Germany), January 2002.
55. *General overview of entanglement with quantum optical systems*, 2002 Winter Conference on Condensed Matter Physics, Aspen (USA), February 2002.
56. *Entanglement and distillation in quantum optical systems*, IV Adriatico research conference on quantum interferometry, Trieste (Italy), March 2002.
57. *Recent results in quantum information theory*, European research conference on Quantum Information, San Feliu de Guixols (Spain), March 2002.
58. *Entanglement of states and operations*, Workshop on Decoherence, Durham (UK), April 2002.
59. *Entanglement in Quantum Optical Systems*, Quantum Electronics and Laser Conference, Long Beach (USA), May 2002.
60. *Advances in Quantum Information and Computation*, 2002 Meeting of the American Physical Society DAMOP, Williamsburg (USA), May 2002.
61. *Gaussian operations and states*, A2 Meeting, Braunschweig (Germany), June 2002.
62. *Entanglement of states and physical operations*, International conference on Quantum Communication, Measurement and Computing, Boston (USA), July 2002.
63. *Entangling atomic ensembles*, EPS 12 Trends in Physics, Budapest (Hungary), August 2002.
64. *Quantum Information Processing and Communication with Quantum Optical Systems*, Trends in Nanotechnology (TNT) 2002, Santiago de Compostela (Spain), September 2002.
65. *Quantum Information Processing and Communication*, COSMOCAIXA 2002, Madrid (Spain), September 2002.
66. *Entanglement in Multiparticle systems*, Symposium on Quantum Information, Uppsala (Sweden), October 2002.
67. *Entanglement properties of Gaussian states*, Workshop on Quantum Information, Cryptography, and Error Correction, MSRI, Berkley (USA), November 2002.
68. *Quantum Information Processing with Quantum Optical Systems*, Meeting of the Royal Society, London (UK), November 2002.
69. *Quantum information processing in optical lattices*, Symposium 'Cold atoms and quantum information', Collège de France, Paris (France), February 2003.
70. *Quantum Information processing with quantum optical systems*, SQUINT 5th Annual Meeting, Santa Fe (USA), February 2003.
71. *Entanglement creation in multiparticle systems*, Obergurgl Meeting 2003, Obergurgl (Austria), February 2003.

72. *Quantum information and quantum optical systems*, DPG Frühjahrstagung, Hannover (Germany), March 2003.
73. *Entanglement of Formation of Gaussian States*, Continuous Variable Quantum Information Processing Workshop, Aix en Provence (France), April 2003.
74. *Limits on Gates with trapped ions*, Simons Conference on Quantum and Reversible Computation, Stony Brook (USA), May 2003.
75. *Quantum Information with quantum optical systems*, Gordon Research Conference on Atomic Physics, Tilton School (USA), June 2003.
76. *Strong correlation effects in cold atomic gases*, ICOLS 03, Palm Cove (Australia), July 2003.
77. *Entanglement of Gaussian states and spin systems*, Workshop on Quantum Measurements and Quantum Stochastics, Aarhus (Denmark), August 2003.
78. *Entanglement in spin and harmonic oscillator lattices*, Quantum Challenges II, Warsaw (Poland), September 2003.
79. *Entanglement and strong correlation effects in optical lattices*, Euresco conference BEC 2003, San Feliu de Guixols (Spain), September 2003.
80. *Entanglement in Atomic Systems*, 304. WE-Heraeus-Seminar, Bad Honnef (Germany), October 2003.
81. *Quantum cryptography*, Meeting of the Spanish Mathematical Society, Barcelona (Spain), November 2003.
82. *Entanglement and correlations in spin and quantum optical systems*, Lorentz Center Workshop Fundamentals of Solid State Quantum Information Processing, Leiden (Netherlands), December 2003.
83. *Entanglement in spin systems*, Gordon Conference on Quantum Information, Ventura (USA), February 2004.
84. *Quantum Information with Quantum Optical Systems*, LATSIS Symposium, Lausanne (Switzerland), March 2004.
85. *Boson and Fermions in Optical Lattices*, Workshop on Cold Fermions, Levico (Italy), March 2004.
86. *Studying strong correlation effects in optical lattices*, KITP Conference on Frontiers in Quantum Gases, Santa Barbara (USA), May 2004.
87. *Fast gates and quantum simulations with trapped ions*, Workshop on the development of the trapped ion quantum computer, University of Michigan, Ann Arbor (USA), May 2004.
88. *Fast Quantum Gates and Coherent Control with Trapped Ions*, CLEO/IQEC 04, San Francisco (USA), May 2004.
89. *Quantum spin systems: entanglement and implementations*, ICAP 2004, Rio de Janeiro (Brasil), July 2004.
90. *Multiparticle entangled states*, Workshop on Quantum Entanglement, Decoherence, Information and Geometrical Phases in Complex Systems, Trieste (Italy), November 2004.
91. *Teoría cuántica de la información: conceptos básicos y aplicaciones*, Encuentro Física Fundamental "Alberto Galindo" November 2004.
92. *Projected-pair entangled states: properties and applications*, Workshop on Entanglement and Quantum Information, Pisa (Italy), December, 2004.
93. *PEPS: properties and applications*, Workshop on Entanglement and Quantum Information, Oberwolfach (Germany), January 2005.
94. *BEC with ions and scalable quantum computation with neutral atoms*, Banff Cold Atom Meeting, Calgary (Canada), February 2005.
95. *Quantum Information processing and simulations with quantum optical systems*, Gordon Conference on Quantum Information Systems, Ventura (USA), March 2005.

96. *Ordenadores y dispositivos cuánticos: nuevos retos para el siglo XXI*, Jornadas Ciencia y sociedad IX: Españoles en la vanguardia de la ciencia, Madrid (Spain), March 2005.
97. *Quantum Information Processing with Quantum Optical Systems*, ESF-JSPS Frontier Science Conference Series for Young Researchers: Quantum information and Quantum Physics, Tokyo (Japan), March 2005.
98. *Quantum information, Quantum Optics and Spin Systems*, Physics 2005: a century after Einstein, Warwick (UK), April 2005.
99. *Quantum computations and simulations*, Frontiers in Quantum Physics, Madrid (Spain), April 2005.
100. *Entanglement in complex quantum systems*, Conference on Quantum Computation and Information, Crete (Greece), May 2005.
101. *Nuevos estados de la material*, Centenario del "annus mirabilis" de Einstein (1905-2005), Madrid (Spain), May 2005.
102. *Simulating quantum many-body systems*, International Conference on Laser, Applications and Technologies (LAT), St. Petersburg (Russia), May 2005.
103. *Información cuántica*, Las fronteras de física, Valencia (Spain), May 2005.
104. *Basic concepts in Quantum Information Theory*, Quantum Physics of Nature: Theory, Application and Interpretation, Vienna (Austria), May 2005.
105. *Simulating quantum Systems*, CMS/CSHPM Summer Meeting 2005.
106. *Quantum Information Processing with quantum Optical Systems*, Control and Manipulation of quantum Systems, Ascona (Switzerland), July 2005.
107. *Quantum Information Theory: Challenges and Perspectives*, Albert Einstein Annus Mirabilis 2005, San Sebastian (Spain), September 2005.
108. *Simulating quantum many-body systems*, Bose-Einstein Conference, San Feliu de Guixols (Spain), September 2005.
109. *Información Cuántica: nuevos retos y perspectives*, Bienal de Física, Ourense (Spain), September 2005.
110. *Quantum information*, Amazing Light Conference, Berkeley (USA), October 2005.
111. *Imaging the quantum world*, International Symposium: Scientific Imaging: Seeing the Invisible, Madrid (Spain), November 2005.
112. *Simulation of quantum many-body systems*, 13. International Conference on recent Progress in Many Body Physics, Buenos Aires (Argentina), December 2005.
113. *Simulating Quantum Many-Body Systems*, Workshop on Bose-Einstein Condensation and Quantum information, Vienna (Austria), December 2005.
114. *Entanglement with cold ions and atoms*, Quantum information Processing Meeting, Paris (France), January 2006.
115. *Ion Traps and cold atoms for quantum computers*, Annual APS March Meeting 2006, Baltimore (USA), March 2006.
116. *Quantum Simulations in Many-Body Systems*, Cold Atoms Meet condensed Matter (CATCOM), Dresden (Germany), March 2006.
117. *Many-body phenomena in ion traps*, Workshop: Correlated and Many-body Phenomena in Dipolar Systems, Dresden (Germany) 30 May 2006
118. *Sistemas cuánticos de comunicación y computación*, Seminario de Algorítmica y Criptografía cuántica, Madrid (Spain), 05 June 2006

119. *Simulating quantum many-body systems*, Workshop: Time in Quantum Mechanics, Tenerife (Spain), 13 June 2006
120. *Quantum simulations and phase transitions with trapped ions*, 20th International Conference on Atomic Physics (ICAP) Satellite Meeting “Atomic Physics with Trapped Ions”, Innsbruck (Austria), 24 July 2006
121. *Quantum Simulations: Classical and quantum computational methods*, International Conference on Quantum Foundation and Technology (ICQFT) '06, Hangzhou (China), 28 July 2006
122. *Ions in Traps*, Workshop: Quantum Computation and Information, Universität Regensburg (Germany), 15 November 2006
123. *Efficient simulation of quantum systems*, QIP Workshop Brisbane (Australia), 31 January 2007
124. *Quantum Information*, Workshop on Quantum Information and Many-Body Quantum Systems, Pisa (Italy), 28 March 2007
125. *Quantum simulations with classical and quantum systems*, Workshop on Quantum Engineering with Neutral Atoms and Light, Herrsching (Germany), 16 June 2007
126. *La física cuántica en la sociedad de la información*, OPTOEL 07 Conference Bilbao (Spain), 11 July 2007
127. *New algorithms to simulate many-body quantum systems*, PAQ 07 Conference London (England), 05 September 2007
128. *Quantum Simulations with Classical and Quantum Systems*, Seminar on Time Dependent Phenomena Blaubeuren (Germany), 13 September 2007
129. *Quantum Simulations: classical and quantum approaches*, DPG Physics School Quantum Informations and Quantum Simulation, Bad Honnef (Germany), 17 September 2007
130. *Quantum Information Processing: Present Status and Perspectives*, Symposium in Honor of CN Yan (Singapore), 1 November 2007.
131. *Quantum State Generation in Many-Body Quantum Optical Systems*, QAO Downunder Workshop Wollongong (Australia), 04 December 2007
132. *Quantum Simulations*, TQC - University of Tokyo (Japan), 30. January to 2. February 2008
133. *Simulation of many-body quantum systems: a quantum information perspective*, Aspen Conference, Aspen (USA), 8. February 2008
134. *Computación cuántica: Retos y Perspectivas*, Universidad Autónoma de Barcelona (Spain), 22 May 2008
135. *Quantum Information Theory: Applications and challenges*, 5th European Congress of Mathematics Amsterdam (Netherlands), 14 July to 18 July 2008
136. *Quantum computing and state engineering via dissipation*, Gordon Research Conference Big Sky Montana (USA), 31 August to 5 September 2008
137. *Efficient description of many-body quantum system*, Quantum Fluids and Strongly Correlated Systems Conference, Paris (France), 15 September to 16 September 2008
138. *Quantum computation, quantum state engineering and quantum phase transitions driven by dissipation*, QICS Workshop Oberurgl (Austria), 18 September to 20 September 2008
139. *Quantum Theory of Condensed Matter*, 24th Solvay Conference in Physics, Brussel (Belgium), 11 October to 13 October 2008
140. *Difficult Problems in Quantum Information Theory*, 2008 xQIT Conference at MIT, Cambridge (USA), 19 November to 21 November 2008

141. *Open Quantum Systems: Decoherence and Control*, ITAMP Workshop Cambridge (USA) 21 November 2008
142. *Creation of entangled photons out of entangled atoms*, SFB Conference at Innsbruck (Austria) 29 January 2009
143. *Scientific Symposium in honour of Prof. Ertmer*, Leibniz Universität Hannover (Germany), 13 February 2009
144. *Quantum computation, state engineering and phase transitions driven by dissipation*, SCALA Meeting at Cortina d'Ampezzo 15 February to 21 February 2009
145. *Bloch Oscillations and Landau-Zener Tunneling: From Hot Electrons to Ultracold Atoms – BOLTZ 2009*, Max-Planck Institute for Physics of Complex Systems, Dresden (Germany), 4 May to 8 May 2009
146. *Cooling & Calculating, Quantum Walks & Feedback*, Bonn (Germany), 6 July to 8 July 2009
147. *Seminar on Physics of Cold Trapped Atoms – LPHYS Workshop*, Barcelona (Spain), 13 July to 17 July 2009
148. *Quantum Theory and Symmetries 6*, Department of Physics&Astronomy, University of Kentucky, Lexington (USA), 20 July to 25 July 2009
149. *Collective effects in the interaction of light and atoms*, Bose-Einstein Condensation 2009 Frontiers in Quantum Gases, San Feliu de Guixols (Costa Brava), Spain, 5 September – 11 September 2009
150. *Átomos fríos: un nuevo laboratorio para estudiar sistemas cuánticos de muchas partículas* XXXII Edición de la Reunión de la Real Sociedad Española de Física, Ciudad Real, Spain, 7 September to 11 September 2009
151. *Classical and Quantum simulations*, (QIPC) International Conference, Rom, Italy, 21 September to 25 September 2009
152. *Protected Entangled-Pair and Plaquette States*, CTS/Cecam/QSIT Workshop, Zurich, Switzerland, 11 November to 13 November 2009
153. *Simulation of Quantum Many-Body Systems: A Quantum Information Perspective*, Conference on Computational Physics (CCP), Kaohsiung, Taiwan, 15 December to 19 December 2009
154. *Efficient description of many-body systems with projected entangled-pair states*, Workshop on Quantum Information Science and Many-body Physics, Tainan, Taiwan, 19 December to 20 December 2009
155. *Classical simulation of many-body quantum systems*, QIP Workshop, Zurich, Switzerland, 17 January 2010
156. *Quantum simulations: Experimental and Theoretical advances*, VI Encuentro Franco-Español de Química y Física del Estado Sólido, Tarragona (Spain), 17 March 2010
157. *Quantum optical technologies: from atomic ensembles to microscopic dielectric objects*, ISPQT – Tokyo (Japan), 5 April to 9 April 2010
158. *Description of many-body systems using MPS, PEPS and other families of states*, Emergence&Entanglement Workshop – Waterloo/Ontario (Canada), 24 May to 29 May 2010
159. *“Quantum information: Theory, Applications and Challenges”* 10th European Conference on Atoms, Molecules and Photons, Salamanca (Spain), 5 July 2010
160. *“A new view of Nature and much more”*, DONOSTIA-Passion of Knowledge Workshop, San Sebastian (Spain), 27 September to 30 September 2010
161. *“Dissipation: a new tool for quantum information processing”* International Conference on Quantum Information and Computation, Stockholm (Sweden), 3 October to 4 October 2010

Lectures in Summer Schools and Special Courses

1. *Quantum Communication and Computing*, (4 lectures of 1 hour), European PhD Summer School in Physics, Trento (Italy), 8-20 June 1997.
2. *Quantum Information*, (5 lectures of 1.5 hours), Universidad de Barcelona (Spain), 26-30 January 1998.
3. *Quantum Information*, (4 lectures of 1 hour), International School of Physics Enrico Fermi, Varenna (Italy), 27 June-9 July 2000.
4. *Error correction and physical implementations*, DPG Schule für Physik Quanten-Computing und Information, Physikzentrum Bad Honnef (Germany), 9-13 October 2000.
5. *Quantum Information*, (6 lectures of 1 hour), Summer school on theoretical Physics, Stellenbosch (Southafrica), 23 January- 2 February 2001.
6. *The physics of entanglement*, (3 lectures of 1 hour), Seminar of Rhodanien, Dolomieu (France), 26 February- 2 March 2001.
7. *Entanglement*, (3 lectures of 1.5 hours), Les Houches school on quantum entanglement, Les Houches (France), 26 - 28 March 2001.
8. *Quantum Information*, (3 lectures of 2 hours), University of Heidelberg, Heidelberg (Germany), 17-19 April 2001.
9. *Quantum Computation*, (2 lectures of 2 hours), Cursos de verano de la Universidad Internacional Menendez Pelayo, 2-7 July 2001.
10. *Entanglement in Atomic Systems*, (1 lecture of 1 hour), International School of Physics Enrico Fermi, Varenna (Italy), 17-27 July 2001.
11. *Entanglement and distillability*, (3 lectures of 1.5 hours), IX Escuela de Fisica Teorica, Santiago de Compostela (Spain), 3-14 September 2001.
12. *Quantum Information*, (4 lectures of 1 hour), VII Granada Seminar, Granada (Spain), 1-4 September 2002.
13. *Quantum entanglement theory: measurements and manipulation* (2 lectures of 1.5 hours), International School on Quantum Computation and Information, Lisboa (Portugal), 4-7 September 2002.
14. *Entanglement in Atomic Systems I and II* (2 lectures of 1.5 hours), Workshop on Quantum Information and Quantum Computation, Trieste (Italy), 14-25 October 2002.
15. *Separability and entanglement in Quantum Information* (1 lecture of 1 hour), Workshop on Entanglement at the nanoscale, Trieste (Italy), 28 October- 8 November 2002.
16. *Strongly correlated systems with cold atomic gases* (3 lectures of 1.5 hours), School on quantum gases in low dimensions, Les Houches (France), 15-25 April 2003.
17. *Quantum Optics and Quantum Computation Theory* (3 lectures of 1.5 hours), WEH Summer School, Wittenberg (Germany), 28-30 July 2003.
18. *Quantum Information Theory* (20 hours), Curso de Doctorado, University Autónoma of Madrid (Spain), 2-6 February 2004.
19. *Basics of Quantum Information Theory* (3 hours), Summer School on Quantum Optics and Quantum Information, Niels Bohr Institute, Copenhagen (Denmark), 11-13 August 2004.
20. *Entanglement and purification* (4.5 hours), Summer School on the Basics of Quantum Information, Cargesse (France), 22-25 August 2004.

21. *Quantum computations and simulations*, Campus de Excelencia 2005, Tenerife (Spain), June 2005.
22. *Efficient representation of certain many-body quantum states* (3 lectures of 1.5 hours), Summer School on Quantum Information Science, Kochi (Japan), 30 August – 3 September 2005
23. *Quantum Repeaters & Quantum Computing* (2 Lectures of 1.5 hours), Winter College on Quantum and Classical Aspects of information Optics, Trieste (Italy), 30 January – 10 February 2006.
24. *Fermions and Quantum Information* (2 Lectures of 1.5 hours), International School of Physics “Enrico Fermi” on Ultra-Cold Fermi Gases, Varenna (Italy), 26 June – 28 June 2006.
25. *Quantum Information* (2 Lectures of 1.5 hours), International Conference on Atomic Physics (ICAP) – Summer School, Innsbruck (Austria), 10 July – 11 July 2006.
26. *Computación y Comunicación Cuántica*, Cursos de Verano de la Universidad Complutense de Madrid, San Lorenzo de El Escorial (Spain), 31 July 2006
27. *Quantum Information* (5 Lectures of 1.5 hours), Pre-Doctoral School on Laser Cooling and Bose Einstein Condensation, Les Houches (France), 18 September – 20 September 2006
28. *Ensemble-based Quantum Information Processing*, QUROPE Winter School on Quantum Information, Obergurgl (Austria), 18 February – 24 February 2007
29. *Quantum Computation and Topological Orders*, Cursos de Verano de la Universidad Complutense de Madrid, San Lorenzo de El Escorial (Spain), 16 July – 20 July 2007
30. *Hacia una nueva sociedad de la información a través de la física cuántica* (1 lecture of 2 hours) ,UIMP Aula de Verano Santander (Spain), 27 August 2007
31. *Entangled States: theory and applications* , QUIC 07 Summer School Maynooth (Ireland), 31 August 2007
32. *Física Cuántica, Informática y Comunicación: una nueva era tecnológica para el siglo XXI* (3 lectures of 1 hour), Clases Magistrales Cátedra Madrid (Spain), 12 November 2007
33. *Condensed Matter Physics and Quantum Information with Cold Atoms* (3 lectures of 1.5 hours) 25th Jerusalem Winter School in Theoretical Physics (Israel), 26 December – 30 December 2007
34. *Introducción a los simuladores cuánticos*, Summer school Universidad de Oviedo (Spain), 15 September 2009
35. *A quantum information perspective of quantum many-body systems*, Spring school on transport in nanostructures, Capri (Italy), 12 April to 13 April 2010
36. *Entanglement in quantum many-body systems: from area laws to tensor networks* (4 lectures of 1.5 hours), Les Houches (France) summer school on Many-body physics with ultracold gases, 28 June to 2 July 2010

Seminars and Colloquia

1. *Cooling a trapped ion with a standing wave*, Joint Institute for Laboratory Astrophysics, Boulder (USA), 12 September 1991.
2. *Preparation of Fock states by observation of quantum jumps in ion traps*, National Institute for Standards and Technology, Gaithersburg (USA), 9 September 1992.
3. *Generation of nonclassical motional states in ion traps*, University of Hamburg (Germany), 8 December 1992.
4. *Non-classical states of motion in ion traps*, Joint Institute for Laboratory Astrophysics, Boulder (USA), 17 September 1993.
5. *Quantum statistical properties of a laser cooled ideal gas*, National Institute of Standards and Technology, Gaithersburg (USA), 19 November 1993.

6. *Schemes for atomic state teleportation*, National Institute of Standards and Technology, Gaithersburg (USA), 19 August 1994.
7. *The bose: a theoretical description for the atom laser*, Harvard University, Cambridge (USA), 17 August 1994.
8. *Cooling with external fields: the elevator cooling*, Massachusetts Institute of Technology, Cambridge (USA), 10 September 1994.
9. *Teleportation*, University of Innsbruck (Austria), 17 November 1994.
10. *Quantum computations with trapped ions*, University Konstanz (Germany), 25 November 1994.
11. *Quantum computations with cold trapped ions*, École Normal Supérieure, Paris (France), 11 July 1995.
12. *Ion traps*, University of Ulm (Germany), 27 November 1995.
13. *Ion traps*, University of Innsbruck (Austria), 11 December 1995.
14. *Trapped ions in the strong excitation regime: ion interferometry and non-classical states*, Joint Institute for Laboratory Astrophysics, Boulder (USA), 17 October 1995.
15. *Trapped ions in the strong excitation regime: ion interferometry and non-classical states*, Los Alamos National Laboratory (USA), 20 October 1995.
16. *Error correction in Quantum Computing*, California Institute for Technology, Pasadena (USA), 30 January 1996.
17. *Quantum Reservoir Engineering*, University of Auckland (New Zealand), 2 February 1996.
18. *Computación Cuántica*, University of Granada (Spain), 29 April 1996.
19. *Quantum mechanics with trapped ions*, Max Plank Institute for Quantum Optics, Garching (Germany), 11 June 1996.
20. *Quantum reservoir engineering*, Institute for Theoretical Physics, Santa Barbara (USA), 18 October 1996.
21. *Schrödinger lions made out of bosons*, University of Trento (Italy), 13 February 1997.
22. *Quantum Communication and Computation*, University Autónoma of Madrid (Spain), 22 September 1997.
23. *Quantum Communication and Computation*, University Complutense of Madrid (Spain), 23 September 1997.
24. *Creation of Solitons and Vortices in Bose-Einstein-Condensates*, Institute for Theoretical Physics, Santa Barbara (USA), 11 February 1998.
25. *Comunicacion cuantica en presencia de ruido*, University of Salamanca (Spain), 19 November 1998.
26. *Black holes with Bose-Einstein condensates*, Benasque Center for Science (Spain), 24 July 1999.
27. *Quantum Information Processing*, AMOLF, Amsterdam (Netherlands), 6 December 1999.
28. *Quantum Communication and Computation*, University Autónoma of Madrid (Spain), 17 December 1999.
29. *Quantum Computing with arrays of microtraps*, Max-Planck Institute for Quantum Optics, Garching (Germany), 17 February 2000.
30. *Separability and distillability of mixed states*, University Autónoma of Madrid (Spain), 22 May 2000.
31. *Separability and distillability of mixed states*, Laboratory Kastler, École Normal Supérieur, Paris (France), 7 June 2000.

32. *Quantum optical approach to Bose-Einstein condensation and quantum information process*, Max--Plank Institute for Quantum Optics, Garching (Germany), 1 September 2000.
33. *¿Se puede construir un ordenador cuántico?*, Agora de la Ciencia, Residencia de Estudiantes del CSIC, Madrid (Spain), 19 October 2000.
34. *El futuro de la computación cuántica*, University of Zaragoza (Spain), 13 November 2000.
35. *Multiatom entanglement with Bose-Einstein condensates*, Erwin Schrödinger Institute, Vienna (Austria), 4 December 2000.
36. *Irreversibilidad en la manipulación asymptotical de entanglement*, Universidad de Cantabria, Santander (Spain), 9 February 2001.
37. *Progress on Bose-Einstein condensation and quantum information*, University of Hannover (Germany), 14 February 2001.
38. *Anyons in Bose-Einstein condensates*, NIST, Gaithersburg (USA), 7 March 2001.
39. *Anyons in Bose-Einstein condensates*, ITAMP, Cambridge (USA), 12 March 2001.
40. *Entanglement in Bose-Einstein condensates*, University of Kaiserslautern (Germany), 7 May 2001.
41. *Separability and distillability in quantum information*, Technische Universität Munich (Germany), 30 May 2001.
42. *Quantum Entanglement: Theory and Applications*, University of Castilla-La Mancha, Ciudad Real (Spain), 26 September 2001.
43. *Anyons in Bose-Einstein condensates*, Ludwig-Maximilian Universität, Munich (Germany), 9 January 2002.
44. *Anyons in Bose-Einstein condensates*, Joint Institute for Laboratory Astrophysics, Boulder (USA), 7 February 2002.
45. *Quantum information processing with quantum optical systems*, Max-Planck Institut für Quantenoptik, Garching (Germany), 26 February 2002.
46. *Some mathematical problems in Quantum Information Theory*, École Normal Supérieur, Paris (France), 2 April 2002.
47. *Strongly correlated systems and BEC*, LENS, Florence (Italy), 10 May 2002.
48. *Physical operations with Gaussian states*, CALTECH, Pasadena (USA), 24 May 2002.
49. *Quantum information in quantum optical systems*, University of Regensburg (Germany), 17 November 2003.
50. *Quantum information in quantum optical systems*, ETH Zürich (Switzerland), 12 November 2003.
51. *Entanglement and correlations in spin systems*, University of Augsburg (Germany), 2 December 2003.
52. *Quantum Information: basic concepts and applications*, Orsay (France), 16 December 2003.
53. *Quantum Information processing with quantum optical systems*, Orsay (France), 18 December 2003.
54. *Quantum Information and Quantum Optical Systems*, University of Geneva (Switzerland), 23 January 2004.
55. *Quantum Information and Quantum Optical Systems*, University of Freiburg (Germany), 9 February 2004.
56. *Localizable entanglement and projected entangled pair states*, MIT (USA), 5 April 2004.
57. *Quantum Behaviour in ion traps and optical lattices*, University of Harvard (USA), 6 April 2004.
58. *Quantum Information and Quantum Optical systems*, University of Tübingen (Germany), 20 April 2004.

59. *Quantum information processing and quantum optical systems*, University of Karlsruhe, 11 June 2004.
60. *Projected entangled-pair states: properties and applications*, University Toronto (Canada), 19 November 2004.
61. *BEC and strong correlation behavior in trapped-ion systems*, University Toronto (Canada), 19 November 2004.
62. *BEC with ions and scalable quantum computation with neutral atoms*, Harvard University (USA), 9 February 2005.
63. *Entangled-Pair Protected States: Properties and Applications*, CALTECH, Pasadena (USA), 22 February 2005.
64. *Simulation of quantum many-body systems*, Max-Planck Institut für Physik komplexer Systeme, Dresden (Germany), 25 April 2005.
65. *Renormalization algorithms for the simulation of many-body quantum systems*, Universita La Sapienza, Roma (Italy), 17 May 2005.
66. *Quantum information Processing with Quantum Optical Systems*, Max-Planck Institut für Quantenoptik, Dresden (Germany), 23 May 2005.
67. *Challenges and Perspectives*, Instituto Nacional de Técnica Aeroespacial, Madrid (Spain), 11 November 2005.
68. *Algo sobre información cuántica*, Universidad de Sevilla (Spain), 22 November 2005.
69. *Quantum Simulations in Many-Body Systems*, Universität Kaiserslautern (Germany), 31 January 2006.
70. *Trapped ions for quantum simulations and computations*, Universität Ulm (Germany), 02 February 2006.
71. *PEPS: theory and applications*, University of Cambridge (UK), 01 March 2006.
72. *Quantum simulations in many-body systems*, Center of Logic and Computation, Instituto Superior Técnico, Lissabon (Portugal), 16 May 2006
73. *Computación y comunicación cuántica: Retos y perspectivas*, Real Academia española de Ciencias, Madrid (Spain), 17 May 2006
74. *Computación y comunicación cuántica: Retos y perspectivas*, Cap Aranjuez, Madrid (Spain), 18 May 2006
75. *Quantum Many-Body Systems: A quantum information perspective*, Universität Marburg (Germany), 22 May 2006
76. *Quantum Simulations with Trapped Ions*, SFB Herrsching (Germany), 25 May 2006
77. *Computación y comunicación cuántica*, Universidad de La Laguna, Tenerife (Spain), 14 June 2006
78. *Quantum Simulations*, Universidad Autónoma de Barcelona (Spain), 14 September 2006
79. *Many-body physics: a quantum information perspective*, Universidad de Zaragoza (Spain), 24 October 2006
80. *La Física cuántica en la sociedad de la información*, Universidad de Zaragoza (Spain), 25 October 2006
81. *La Física Cuántica en la sociedad de la información*, Universidad de Santiago de Compostela (Spain), 17 November 2006
82. *La vision del mundo desde la óptica de la física cuantica*, Taller de periodismo científico, Ciudad Real (Spain), 11 December 2006
83. *Una vision del mundo a través de la Física Cuántica*, Universidad de Murcia (Spain), 09 January 2007
84. *Computación y Simulación cuántica*, Universidad de Valencia (Spain), 11 January 2007
85. *La visión del mundo desde la perspectiva de la física cuántica*, Ayuntamiento de Manresa (Spain), 15 January 2007

86. *Una ventana al mundo microscópico*, Academia de Bellas Artes Barcelona (Spain), 16 January 2007
87. *Informática y comunicación a través de la física cuántica*, Imaginatica 07 Sevilla (Spain), 07 February 2007
88. *Quantum Many-Body Systems: Simulations and beyond*, University of Maryland (USA), 16 April 2007
89. *Tecnologías cuánticas para la información*, Universidad Complutense de Madrid (Spain), 26 April 2007
90. *La física cuántica en la sociedad de información*, Ateneo de Madrid (Spain), 27 April 2007
91. *Conferencia de Clausura*, El área europea del conocimiento, Universidad Complutense de Madrid (Spain), 11 March 2007
92. *Quantum many-body systems: simulations and beyond*, DIPC, San Sebastian (Spain), 04 May 2007
93. *Efficient descriptions of many-body systems: Simulations and beyond*, Universität Köln (Germany) , 11 May 2007
94. *Quantum Entanglement and it's measures*, Institut Henri Poincaré Paris (France), 16 May 2007
95. *El impacto de la física cuántica en la sociedad*, CSIC Jornadas Madrid (Spain), 14 June 2007
96. *Quantum many-body systems: simulations and beyond*, UPV Bilbao (Spain), 10 July 2007
97. *Efficient descriptions of many-body systems: Simulations and beyond*, PSI Villigen (Switzerland), 07 September 2007
98. *La física cuántica en la sociedad de la información*, CosmoCaixa Set of Talks Barcelona (Spain), 16 October 2007
99. *A quantum information perspective of many-body physics*, Physikalisches Kolloquium der Univ. Bayreuth (Germany), 8. Januar 2008
100. *A quantum information perspective of many-body physics*, University of Connecticut (USA), 11. February 2008
101. *Quantum State Generation in Many-Body Quantum Optical System*, University of Connecticut (USA), 12. February 2008
102. *Tecnologías cuánticas para el siglo XXI*, CSIC Jornadas Madrid (Spain), 19. February to 20. February 2008
103. *Quantum simulations using classical and quantum computers*, MATHQCI Workshop Madrid (Spain), 26 May to 30 May 2008
104. *Fiscal Cuántica: de paradojas a nuevas tecnologías de la información*, Conferencia del Colegio Madrid,(Spain), 31 May 2008
105. *Classical and quantum simulation of quantum many-body systems*, Physikalisches Kolloquium Universität Ulm (Germany) 23 June 2008
106. *Simulation of quantum many-body systems: a quantum information perspective*, UAB-Instituti Física Teórica Barcelona (Spain), 14 October 2008
107. *Theoretical aspects of tensor network states*, Universidad Complutense de Madrid (Spain), 15 October 2008
108. *Quantum Computational models for quantum optical systems*, ICFO Barcelona (Spain), 20 October 2008
109. *Inauguration – Caixa Manresa Event*, ICFO Barcelona (Spain), 23 October 2008.
110. *La Física Cuántica: implicaciones filosóficas y tecnológicas para el siglo XXI*, Cortes de Aragón Salamanca (Spain), 27 October 2008

111. *Current challenges in the field of quantum technology*, Queen Sofia Spanish Institute New York (USA), 18 November 2008
112. *Tensor networks, many-body systems and quantum information*, Harvard University Cambridge (USA), 24 November 2008
113. *Superradiance, photon processing and anyon braiding with cold atoms*, CUA at MIT Cambridge (USA), 25 November 2008
114. *Nuevas fases de la material: Una expedición en busca del frío*, Caixa Manresa Event at the Auditorium of Barcelona (Spain), 10 January 2009
115. *Computación cuántica: Retos y Perspectivas*, Encuentro sobre Fronteras de la Ciencia – Fundación de Duques, Salamanca (Spain) 25 February 2009
116. *Cooperación hispano-alemana en material de investigación*, Foro Hispano Alemán – Palacio de la Bolsa de Madrid (Spain), 13 March 2009
117. *Quantum computers and communication systems*, IRST Povo/Trento (Italy), 18 May to 19 May 2009
118. *Quantum information: Theory & Experiments*, Facultad de Ciencias (UAM) Madrid, 13 January 2010
119. *Efficient description of many-body systems: simulations and beyond*, Universität Duisburg-Essen, 20 January 2010
120. *Many-body quantum systems: a quantum information perspective*, Universität Stuttgart, 26 January 2010
121. *Informática y Física Cuántica*, Jornada von Neumann at Facultat de Matemàtiques, Barcelona (Spain), 24 February 2010
122. *Computación Cuántica*, Fundación Marcelino Botín, Santander (Spain), 11 March 2010
123. *Computación Cuántica: nuevas tecnologías para el siglo XXI*, Caixa Forum, Tarragona (Spain), 16 March 2010
124. *Información cuántica para el siglo XXI*, XXVII Universitat d'Estiu, Andorra, 19 March 2010

Organization of Conferences and Workshops

1. Benasque Workshop on Quantum Information Science (coorganized with A. Ekert), Benasque (Spain)
 1998: 5 July to 25 July
 2000: 2 July to 21 July
 2003: 22 June to 11 July
 2005: 12 June to 1 July
 2007: 17 June to 29 June
 2009: 07 June to 28 June
2. Euresco Conference on Bose-Einstein Condensation, San Feliu de Guixols (Spain), 15 September to 20 September 2001.
3. Gordon Research Conference on Quantum Information Science (coorganized with P. Zoller), Il Ciocco (Italy), 7 May to 12 May 2006
4. ICTP Workshop on Quantum Phenomena and Information: *From Atomic to Mesoscopic Systems*, Trieste (Italy) 5 May to 16 May 2008
5. Joint Workshop MPQ/Barcelona Research Centers on Quantum Information, San Benet (Spain), 3 December to 6 December 2008
6. Workshop on Quantum Simulation/Computation with Cold Atoms and Molecules, Aspen (USA), 24 May to 6 June 2009

LIST OF PUBLICATIONS

JUAN IGNACIO CIRAC

1.- Published

2010

1. *Generalized Hartree-Fock Theory for Interacting Fermions in Lattices: Numerical Methods*
Ch. V. Kraus, J. I. Cirac, NJP **12**, 113001 (31pp), (2010), [1005.5284](#)
2. *A quantum version of Wielandt's inequality*
M. Sanz, D. Pérez-García, M.M. Wolf, J.I. Cirac, Information Theory, IEEE Transaction on Vol. **56**, Iss. 9, (2010), pages:4668-4673, [0909.5347](#)
3. *PEPS as ground states: degeneracy and topology*
N. Schuch, I. Cirac, D. Perez-Garcia, Annals of Physics, Vol. **325**, Iss 10, p.2153-2192, [1001.3807](#)
4. *Ground-state properties of the spin-1/2 antiferromagnetic Heisenberg model on the triangular lattice: A variational study based on entangled-plaquette states*, F. Mezzacapo, J. I. Cirac, NJP **12**, 103039 (8pp), (2010), [1006.4480](#)
5. *Emerging Bosons with Three-Body Interactions from Spin-1 Atoms in Optical Lattices*
L. Mazza, M. Rizzi, M. Lewenstein, J.I. Cirac, Phys. Rev. A **82**, 043629 (2010), [1007.2344](#)
6. *Cold atom simulation of interacting relativistic quantum field theories*
J. I. Cirac, P. Maraner, J. K. Pachos, Phys.Rev. Lett. **105**, 190403 (2010), [1006.2975](#)
7. *Matrix product state and mean-field solutions for one-dimensional systems can be found efficiently*
N. Schuch, J. I. Cirac, Phys. Rev. A **82**, 012314 (2010), [0910.4264](#)
8. *Modified spin-wave theory with ordering vector optimization: frustrated bosons on the spatially anisotropic triangular lattice*
Ph. Hauke, T. Roscilde, V. Murg, J. I. Cirac, R. Schmied, New J. Phys **12**, 053036, [0912.5213](#)
9. *Limitations of passive protection of quantum information*
F. Pastawski, A. Kay, N. Schuch, I. Cirac, Quantum Information & Computation **10**, 7-8, 0580-0618, [0911.3843](#)
10. *Interfacing nuclear spins in quantum dots to a cavity or traveling-wave fields*
H. Schwager, J. I. Cirac, G. Giedke, New J. Phys. **12**, 043026, [0903.1727](#)
11. *Homogeneous binary trees as ground states of quantum critical Hamiltonians*
P. Silvi, V. Giovannetti, S. Montangero, M. Rizzi, J. I. Cirac, R. Fazio, Phys. Rev A **81**, 062335 (2010), [0912.0466](#)
12. *Hawking Radiation from an Acoustic Black Hole on an Ion Ring*
B. Horstmann, B. Reznik, S. Fagnocchi, J. I. Cirac, Phys Rev. Lett. **104**, 250403 (2010), [0904.4801](#)
13. *Simulating two- and three-dimensional frustrated quantum systems with string-bond states*
A. Sfondrini, J. Cerrillo, N. Schuch, J. I. Cirac, Phys. Rev. B **81**, 214426 (2010), [0908.4036](#)

14. *Continuous Matrix Product States for Quantum Fields*
F. Verstraete, J. I. Cirac, Phys. Rev. Lett. **104**, 190405 (2010) [1002.1824](#)
15. *Fermionic Projected Entangled Pair States*
Ch. V. Kraus, N. Schuch, F. Verstraete, J. I. Cirac, Phys Rev. A **81**, 052338 (2010) [0904.4667](#)
16. *Quantum random networks*
S. Perseguers, M. Lewenstein, A. Acín, J. I. Cirac, Nature Physics **6**, 539 (2010) [0907.3283](#)
17. *Optical Superradiance from Nuclear Spin Environment of Single Photon Emitters*
E. Kessler, S. Yelin, M. D. Lukin, J. I. Cirac, G. Giedke, Phys. Rev. Lett. **104**, 143601 (2010), [1002.1244](#)
18. *Infinite matrix product states, Conformal Field Theory and the Haldane-Shastry model*
J. I. Cirac, G. Sierra, Phys. Rev. B **81**, 104431 (2010), [0911.3029](#)
19. *Pfaffian State Generation by Strong Three-body Dissipation*
M. Roncaglia, M. Rizzi, J.I. Cirac, Phys. Rev. Lett. **104**, 096803 (2010), [0905.1247](#)
20. *Towards electron-electron entanglement in Penning traps*
L. Lamata, D. Porras, J.I. Cirac, J. Goldman, G. Gabrielse, Phys. Rev. A **81**, 022301 (2010), [0905.0644](#)
21. *Quantum interface between light and nuclear spins in quantum dots*
Heike Schwager, J. Ignacio Cirac, Géza Giedke, Phys. Rev. B **81**, 045309 (2010), [0810.4488](#)
22. *Towards Quantum Superposition of Living Organisms*
O. Romero-Isart, M. L. Juan, R. Quidant, J. I. Cirac, New J. Phys. **12** 033015 (2010) [0909.1469](#)
23. *Matrix product operator representations*
V. Murg, J.I. Cirac, B. Pirvu, F. Verstraete, New J.Phys. **12**, 025012 (2010) [0804.3976](#)
24. *Characterizing symmetries in a projected entangled pair state*
D. Perez-Garcia, M. Sanz, C.E. Gonzalez-Guillen, M.M. Wolf, J.I. Cirac, New J. Phys. **12**, 025010 (2010) [0908.1674](#)

2009

1. *Renormalization and tensor product states in spin chains and lattices*
J. I. Cirac, F. Verstraete, J. Phys. A: Math. Theor. **42** (2009) 504004, [0910.1130](#)
2. *Variational matrix-product-state approach to quantum impurity models,*
A. Weichselbaum, F. Verstraete, U. Schollwöck, J. I. Cirac, J. von Delft. Phys. Rev. B **80**, 165117 (2009), [165117](#)
3. *Ground-State Properties of Quantum Many-Body Systems: Entangled-Plaquette States and Variational MonteCarlo,* Fabio Mezzacapo, Norbert Schuch, Massimo Boninsegni, J. Ignacio Cirac, New J. Physics **11** No 8 (2009), [0905.3898](#)
4. *Entanglement in systems of indistinguishable fermions,* M.C. Bañuls, J.I. Cirac, M.Wolf, Journal of Phys, Conf.Ser. **171**, 012032 (2009), [012032](#)
5. *Quantum computation, quantum state engineering, and quantum phase transitions driven by dissipation,*
F. Verstraete, M. M. Wolf, J. I. Cirac, Nature Physics **5**, 633-636, (20 July 2009) [0803.1447](#)
6. *How long can a quantum memory withstand depolarizing noise?,* F. Pastawski, A. Kay, N. Schuch, I. Cirac, Phys Rev. Lett. **103**, 080501 (2009), [0904.4861](#)

7. *Simulations of quantum double models*, G. K. Brennen, M. Aguado, J. I. Cirac, New J. Physics **11** No 5 (2009) [0901.1345](#)
8. *Dynamical creation of a supersolid in asymmetric mixtures of bosons*, Tassilo Keilmann, Ignacio Cirac, Tommaso Roscilde, Phys Rev Lett. **102**, 255304 (2009) [0906.1110](#)
9. *Matrix Product States for dynamical simulation of infinite chains*, M. C. Bañuls, M. B. Hastings, F. Verstraete, J. I. Cirac, Phys. Rev. Lett. **102**, 240603 (2009), [0904.1926](#)
10. *Exploring frustrated spin-systems using Projected Entangled Pair States (PEPS)*, V. Murg, F. Verstraete, J. I. Cirac Phys Rev. B **79**, 195119 (2009) [0901.2019](#)
11. *Matrix Product States: Symmetries and Two-Body Hamiltonians* M. Sanz, M. M. Wolf, D. Perez-Garcia, J. I. Cirac, Phys. Rev. A **79**, 042308 (2009), [0901.2223](#)
12. *Quantum simulations based on measurements and feedback control* K. G. H. Vollbrecht, J. I. Cirac, Phys. Rev. A **79**, 042305 (2009) [0811.1844](#)
13. *A de Finetti representation theorem for infinite dimensional quantum systems and applications to quantum cryptography* R. Renner, J. I. Cirac, Phys. Rev. Lett. **102**, 110504 (2009), [0809.2243](#)
14. *Lieb-Liniger Model of a Dissipation-Induced Tonks-Girardeau Gas* S. Dürr, J. J. García-Ripoll, N. Syassen, D. M. Bauer, M. Lettner, J. I. Cirac, and G. Rempe, Phys. Rev. A **79**, 023614 (2009), [0809.3696](#)
15. *Quantum circuits for strongly correlated quantum systems* F. Verstraete, J. I. Cirac, J. I. Latorre, Phys. Rev. A **79**, 032316 (2009), [0804.1888](#)
16. *Dissipation induced Tonks-Girardeau gas in an optical lattice* J. J. García-Ripoll, S. Dürr, N. Syassen, D. M. Bauer, M. Lettner, G. Rempe, J. I. Cirac, New J. Phys. **11**, 013053 (2009), [0809.3679](#)
17. *Pairing in fermionic systems: A quantum information perspective* Christina V. Kraus, Michael M. Wolf, J. Ignacio Cirac, Geza Giedke, Phys. Rev. A **79**, 012306 (2009), [0810.4772](#)

2008

18. *Matrix product states, projected entangled pair states, and variational renormalization group methods for quantum spin systems*, F. Verstraete, V. Murg, J. I. Cirac, Advances in Physics, Vol. **57**, No. 2, (March 2008), [pp. 143-224](#),
19. *Quantum phases of interacting phonons in ion traps* X.-L. Deng, D. Porras, J. I. Cirac, Phys. Rev. A **77**, 033403 (2008), [quant-ph/0703178](#)
20. *Area laws in quantum systems: mutual information and correlations* M.M. Wolf, F. Verstraete, M.B. Hastings, J.I. Cirac, Phys. Rev. Lett. **100**, 070502 (2008), [0704.3906](#)
21. *Quantum processing photonic states in optical lattices* Christine A. Muschik, I. de Vega, D. Porras and J.I. Cirac, Phys. Rev. Lett. **100**, 063601 (2008), [quant-ph/0611093](#)
22. *Entanglement Distribution in Pure-State Quantum Networks*, S. Perseguers, J. Wehr, A. Acin, M. Lewenstein, J. I. Cirac, Phys. Rev. A **77**, 022308 (2008), [0708.1025](#)
23. *Entropy scaling and simulability by Matrix Product States*, Norbert Schuch, Michael M. Wolf, Frank Verstraete, J. Ignacio Cirac, Phys. Rev. Lett. **100**, 030504 (2008), [0705.0292](#)
24. *Quantum simulators, continuous-time automata, and translationally invariant systems*, K.G.H. Vollbrecht, J.I. Cirac, Phys. Rev. Lett. **100**, 010501 (2008), [0704.3432](#)

25. *Simulation of quantum many-body systems with strings of operators and Monte Carlo Tensor constructions*, N. Schuch, M. M. Wolf, F. Verstraete, J. I. Cirac, Phys. Rev. Lett. **100**, 040501 (2008), [0708.1567](#)
26. *Dividing Quantum Channels*, M.M. Wolf and J.I. Cirac, Com. Math. Phys. **279**, 147 (2008), [math-ph/0611057](#)
27. *Engineering correlation and entanglement dynamics in spin systems*, T. S. Cubitt and J.I. Cirac, Phys. Rev. Lett. **100**, 180406 (2008), [quant-ph/0701053](#)
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