

# LIST OF CONTRIBUTIONS TO CONFERENCES

Nicolas J. Cerf

## Invitations to international conferences / invited lectures or courses

International Workshop on Monte Carlo Methods in Nuclear Structure, European Centre for Theoretical Studies in Nuclear Physics and Related Areas, Trento (Italy), March 14-25, 1994.

Invited talk: *Pairing correlations by a path integral Monte Carlo method.*

Workshop "Quantum Computers and Quantum Coherence", Institute for Theoretical Physics, University of California at Santa Barbara (USA). Duration of 1 month (September 1996).

Invited talk: *Quantum information theory of entanglement.*

5th Quantum Computation Workshop, Institute for Scientific Interchange Foundation, Turin (Italy), June 29 – July 18, 1997.

Invited talk: *Singleton bounds for quantum codes and channels.*

1st NASA International Conference on Quantum Computing and Quantum Communications, Palm Springs (USA), February 17-20, 1998.

Invited talk: *Information-theoretic aspects of quantum coding and copying.*

Dagstuhl Seminar on Quantum Algorithms, International Conference and Research Center for Computer Science, Dagstuhl (Germany), May 11-15, 1998.

Invited talk: *Pauli cloning machines and a related bound on the quantum capacity of the Pauli channel.*

Second talk: *Nesting Grover search algorithm.*

6th Quantum Computation Workshop, Institute for Scientific Interchange Foundation, Turin (Italy), June 29 juin – July 18, 1998.

Invited talk: *Pauli cloning machines in all dimensions.*

Quantum Computing European Pathfinder Project Conference, Helsinki (Finland), September 26-28, 1998.

Invited talk: *Nesting Grover search.*

The Physics of Information Symposium, Brussels, December 17, 1998.

Invited talk: *Quantum cloning machines and the uncertainty principle.*

1st workshop of the ESF programme on Quantum Information Theory and Quantum Computation (session on "Entanglement and Quantum Information Processing" of the Conference on "Complexity, Computation, and the Physics of Information"), Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, July 12-16, 1999.

Invited talk: *Simulating entanglement with classical communication.*

Budmerice Workshop on Quantum Information (Bounds on optimal manipulations with quantum information), Budmerice, Slovakia, October 28 - 31, 2000.

Invited lecture: *Optimal copying of a pair of canonical variables.*

Euroconférence QUICK (Quantum interference and cryptographic keys: novel physics and advancing technologies), Institut d'Etudes Scientifiques de Cargèse, France, April 7-13, 2001.

Invited talk: *Optimal cloning and anticloning of continuous quantum variables.*

Information Theory Days, Stefan Banach International Mathematical Centre, Warsaw, Poland, April 23-25, 2001.

Invited lecture: *Quantum cloning transformations for continuous variables.*

Workshop on Solid State Quantum Computing, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland, April 26-29, 2001.

Invited lecture: *Quantum cloning transformations for continuous variables.*

2nd ESF QIT Conference "Quantum Information: Theory, Experiment and Perspectives", Gdansk, Poland, July 10-18, 2001.

Invited talk: *Continuous-variable cloning machines: the conjugate-inputs cloner can beat the optimal standard cloner.*

Workshop on Quantum Information and Quantum Computation, International Centre for Theoretical Physics, Trieste, Italy, October 14-25, 2002.

Invited lecture: *Quantum cloning with discrete and continuous variables.*

2nd Workshop on Continuous-Variable Quantum Information Processing (CVQIP'03), Aix-en-Provence, France, April 11-14, 2003.

Invited talk: *Non-gaussian quantum cloning of gaussian states.*

3rd Workshop of Classical and Quantum Interference, Research Center for Optics, Olomouc, Czech Republic, October 23-24, 2003.

Invited talk: *Quantum cryptography with continuous variables.*

Workshop on Quantum Information Processing and Quantum Communications, University of Pavia, Italy, November 2003- July 2004.

Invited talk: *Strong covariance and cloning of continuous variables* (January 14, 2004).

3rd Workshop on Continuous-Variable Quantum Information Processing (CVQIP'04), Veilbronn, Germany, April 2-5, 2004.

Invited talk: *Proposal for a loophole-free Bell test using homodyne detection.*

Cargèse International Summer School on Quantum Logic and Communication, Cargèse, France, August 16-28, 2004.

Invited lecture: *Classical and quantum theory of information.*

Newton Institute Workshop on "Quantum Information Theory: Present Status and Future Directions" of the programme "Quantum Information Science", Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, August 23-27, 2004.

Invited talk: *Proposal for a loophole-free Bell test using homodyne detection.*

5th European Quantum Information Processing and Communication (QIPC) Workshop, Roma, Italy, September 20-22, 2004.

Invited talk: *Proposal for a loophole-free Bell test using homodyne detection.*

4th Workshop of Classical and Quantum Interference, Research Center for Optics, Olomouc, Czech Republic, October 21-22, 2004.

Invited talk: *Proposal for a loophole-free Bell test using homodyne detection.*

ESF Exploratory Workshop on Long-distance Quantum Communication Networks with Atoms and Light (CVQIP'05), Prague, Czech Republic, April 9-12, 2005.

Invited talk: *Capacity of Bosonic Gaussian channels with memory.*

Congrès Général de la Société Française de Physique et de la Belgian Physical Society, SFP2005, Lille, France, August 29 – September 2, 2005.

Invited talk: *Quantum key distribution with multi-photon light pulses.*

Workshop on Quantum Information Processing, Technical University of Darmstadt, Germany, December 14-16, 2005.

Invited tutorial lecture: *Quantum cloning and key distribution with continuous variables of light.*

Workshop on “Quantum Information, Computation, and Complexity”, Institut Henri Poincaré, Paris, France, January 4 – April 7, 2006.  
Invited course (9 h): *Classical and quantum information theory; from discrete to continuous variables*.

Graduate studies programme, Katholieke Universiteit Leuven, Leuven, Belgium.  
Invited course (2 weeks, April 2– 14, 2006): *Introduction to Quantum Optics and Quantum Information*.

Joint annual meeting of the Belgian and Dutch Physical Society (FYSICA 2006), Leiden, The Netherlands, April 28, 2006.  
Invited tutorial lecture: *Cloning quantum information; from discrete to continuous variables*

5th Workshop on Continuous-Variable Quantum Information Processing (CVQIP'06), Niels Bohr Institute, Copenhagen, Denmark. May 19-22, 2006.  
Invited talk: *Gaussian, or not Gaussian: that is the question*.

Lorentz workshop “Beyond the Quantum”, Lorentz Center, University of Leiden, The Netherlands, May 29 – June 2, 2006.  
Invited talk: *Loophole-free Bell tests*.

ICO Topical Meeting on Optoinformatics/Information Photonics, St-Petersbourg, Russia September 4-7, 2006.  
Invited talk: *From quantum cloning to quantum key distribution*.

VvTP Symposium 2006 – Physics of security, TU Delft, November 21, 2006.  
Invited talk: *Quantum key distribution; from photon-counting based to coherent-detection based protocols*.

QUROPE Winter School on Quantum Information: Ensemble-based Quantum Information Processing, Obergurgl, Austria, February 18-24, 2007.  
Invited tutorial lecture: *Quantum cryptography with continuous variables (theory)*

Colloque “Aspects théoriques de l’information quantique”, Aspet, France, June 7-8, 2007.  
Invited talk: *Gaussian protocols for quantum key distribution*

Ecole prédoctorale “Optique Quantique”, Les Houches, France, September 10-21, 2007  
Invited course (7.5 h): *De l’information classique à l’information quantique*

International School on Complexity, 8<sup>th</sup> Course: Noise, Information and Complexity @ Quantum Scale, Erice (Sicily), Italy, November 4-10, 2007  
Invited lecture: *Gaussian protocols for quantum key distribution*

EMALI 1<sup>st</sup> Young Researchers Meeting, Institute for Quantum Optics and Quantum Information, Vienna, Austria, May 21-25, 2008  
Invited lecture: *Quantum cryptography with continuous variables*

Second International Summer School “Nanoscience Ile-de-France”, Le Tremblay sur Mauldre, France, June 22-27, 2008.  
Invited lecture: *Continuous-variable quantum key distribution*

Symposium to celebrate the achievements of Anthony Sudbery on the occasion of his 65<sup>th</sup> birthday, University of York, UK, September 29-30, 2008.  
Invited talk: *On Hudson’s Theorem: from pure to mixed states*

2008 xQIT Conference on Difficult Problems in Quantum Information Theory, Massachusetts Institute of Technology, Boston, USA, November 19-20, 2008.  
Invited talk: *On Hudson’s Theorem: from pure to mixed states*

11th International Conference on Squeezed states and Uncertainty relations and 4th Feynman festival, Olomouc, Czech Republic, June 22–26, 2009.

Invited talk: *Unraveling the convex set of non-Gaussian mixed quantum states that are characterized by a classical probability distribution in phase space*

7<sup>th</sup> Workshop on Continuous-Variable Quantum Information Processing,

Max Planck Institute for Quantum Optics, Herrsching (Ammersee), Germany, June 11-14, 2010.

Invited talk: *Information transmission in Gaussian memory channels: a quantum analogue of Shannon's "water-filling" solution*

2011 xQIT Conference on Difficult Problems in Quantum Information Theory, Massachusetts Institute of Technology, Boston, USA, May 3-4, 2011.

Invited talk: *Gaussian Quantum Error Correction*

18<sup>th</sup> Central European Workshop on Quantum Optics, Madrid, Spain, May 30 – June 3, 2011.

Invited talk: *Majorization and the Information Capacity of Gaussian Bosonic Channels*

ESF-PESC Strategic Workshop on Signatures of Quantumness in Complex Systems, Nottingham, UK, June 29 – July 3, 2011

Invited talk: *Majorization and the Information Capacity of Gaussian Bosonic Channels*

8<sup>th</sup> Workshop on Continuous-Variable Quantum Information Processing,

Telecom ParisTech, Paris, September 26-27, 2011.

Invited talk: *Peaceful coexistence between the noiseless linear amplifier and the causality principle*

Workshop on Quantum Information, Foundations and Applications (IQFA), Institut Henri Poincaré, Paris, November 23-25, 2011.

Invited talk: *The Gaussian minimum output entropy conjecture, or can we prove that nothing is less (random) than the vacuum (state)?*

Quantum Information Sciences Workshop (QISW 2012),

Oxford University, Department of Computer Science, March 26-30, 2012.

Invited talk: *Proving that vacuum is a minimum-disorder state using majorization theory.*

9<sup>th</sup> Workshop on Continuous-Variable Quantum Information Processing (CVQIP'12),

Frederiksdal (Copenhagen), Denmark, April 27-30, 2012.

Invited talk: *Can we prove that vacuum is a global majorizing state in a quantum amplifier?*

9th Central European Workshop on Quantum Optics (CEWQO 2012),

Sinaia, Romania, July 2-6, 2012.

Invited talk: *The optical beam splitter under time reversal (halfway between the predictive and retrodictive pictures).*

IV Workshop-School in Quantum Computation and Information (WECIQ 2012),

Fortaleza, Brazil, October 8-11, 2012.

Guest lecture: *On the information capacity of Gaussian bosonic channels*

### **Invited seminars**

*Diffusion Monte Carlo method for the pairing Hamiltonian; simulations and algorithmic analysis*, Kellogg Radiation Laboratory, California Institute of Technology (USA), August 15, 1994.

*Application d'une méthode de Monte Carlo quantique au traitement de l'appariement nucléaire*, Laboratoire de Physique Théorique, Ecole Normale Supérieure de Lyon (France), January 24, 1995.

*Quantum information theory and measurement*, Physics Department, University of California at Irvine (USA), June 18, 1996.

*From classical to quantum information theory*, Courant Institute, New York University (USA), April 15, 1997.

*From classical to quantum information theory*, Center for Non-linear Phenomena and Complex Systems (CENOLI), ULB, November 12, 1997.

*Transmission de données longue distance et calcul haute performance : du classique au quantique*, Observatoire Français des Techniques Avancées (OFTA), Paris, March 14, 2000. Invited tutorial for the work group "Conception et Production de Nanocomposants".

*Des quanta et des bits: les promesses de l'information quantique*, Colloquium de Physique, Université de Liège, Belgium, December 13, 2000.

*Cloning and cryptography with quantum continuous variables*, University of Erlangen, Germany, October 17, 2001.

*Cloning and cryptography with quantum continuous variables*, Colloque "Aspects théoriques de l'information quantique", Institut Henri Poincaré, Paris (France), November 8-9, 2001.

*Conditional generation of large photon-number path entanglement using linear optics*, Colloquium of the German national programme on Quantum Information Processing, Bad Honnef, January 28-30, 2002.

*Coherent-state continuous-variable quantum key distribution*, University of Pavia, Italy, February 24, 2003.

*Non-Gaussian quantum cloning machines*, Institute for Quantum Information, California Institute of Technology (Caltech), USA, July 17, 2003.

*High-rate quantum distribution of secret keys with multi-photon coherent light pulses*, Niels Bohr Institute, University of Copenhagen, Denmark, December 4, 2003.

*Proposal for a loophole-free Bell test using homodyne detection*, Institute for Quantum Information, California Institute of Technology (Caltech), USA, July 6, 2004.

*Proposal for a loophole-free Bell test using homodyne detection*, Séminaire "Systèmes Complexes", Laboratoire de Physique Théorique et Modèles Statistiques, Orsay, France, October 7, 2004.

*Non-Gaussian quantum cloning of Gaussian states*, Department ECM, University of Barcelona, Spain, January 21, 2005.

*Capacity of Bosonic Gaussian channels with memory*, University of Pavia, Italy, May 30, 2005.

*Quantum cloning and key distribution with continuous variables*, FET seminar, DG INFSO, European Commission, Brussels, April 20, 2005.

*Quantum entanglement enhances the capacity of Bosonic Gaussian channels*, Institute for Quantum Information, California Institute of Technology (Caltech), USA, July 12, 2005.

*Quantum key distribution with continuous variables*, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, UK, March 12, 2007.

*Gaussian protocols for quantum key distribution*, Institute for Quantum Information, California Institute of Technology, USA, July 10, 2007.

*Cryptographie et calcul quantique* (conférence)  
Institut des Hautes Etudes Scientifiques de Belgique, October 14, 2008.

*Continuous-variable quantum error correction: possibilities and impossibilities*  
NEC America, Research Labs, Princeton, USA, December 1, 2008.

*Continuous-variable quantum error correction: possibilities and impossibilities*  
Center for Theoretical Physics, Massachusetts Institute of Technology, Boston, USA,  
December 8, 2008

*Continuous-variable quantum error correction: possibilities and impossibilities*  
Quantum Information Science Series, Science Development Program, BBN Technologies, Cambridge,  
USA, January 9, 2009.

*Gaussian Quantum Error Correction*,  
Quantum Information in Paris (QuPa), Institut Henri Poincaré, February 24, 2011.

*The Gaussian minimum entropy conjecture and its importance for the information capacity of Gaussian bosonic channels*,  
International Center for Information & Uncertainty, Palacký University, Olomouc, Czech Republic,  
March 15, 2012.

*The optical beam splitter under time reversal (halfway between the predictive and retrodictive pictures)*,  
Max Planck Institute of Quantum Optics, Garching, Germany, September 19, 2012.

### **Contributions to scientific conferences**

*Monte Carlo approach to nuclear level densities*,  
Contributed talk, 9th Meeting between Astrophysicists and Nuclear Physicists, Bruxelles (Belgium),  
December 9-10, 1991.

*Nuclear level densities and parity distribution*,  
Contributed talk, 10th Meeting between Astrophysicists and Nuclear Physicists,  
Bruxelles (Belgium), December 7-8, 1992.

*Nuclear level density for the determination of astrophysical reaction rates*,  
Contributed talk, European research conference on Nuclear Physics & Nuclear Astrophysics, Limin  
Hersonissos (Greece), May 29 – June 3, 1993.

*Influence of nuclear models on r-process abundances*,  
Poster (V. Bouquelle and N. Cerf), European research conference on Nuclear Physics & Nuclear  
Astrophysics, Limin Hersonissos (Greece), May 29 – June 3, 1993.

*Combinatorial nuclear level density by a Monte Carlo method*,  
Contributed talk, International Conference on the Future of Nuclear Spectroscopy,  
Aghia Pelaghia (Greece), June 28 – July 3, 1993.

*Combinatorial nuclear level density for the determination of astrophysical reaction rates*,  
Poster (N. Cerf, M. Rayet, and M. Arnould), 8th Int. Symposium on Capture Gamma-Ray Spectroscopy  
and Related Topics, Fribourg (Switzerland), September 20-24, 1993.

*Memory Capacity of Large Idiotypic Networks*,  
Poster (J. Boutet de Monvel, N. J. Cerf, and O.C. Martin, Nordita Summer School on “Complex Systems:  
Chaos, Turbulence, Neural Networks”, Humlebaek, Denmark, 1993.

*Realistic level density calculation for heavy nuclei,*

Contributed talk, International Conference on Nuclear Data for Science and Technology, Gatlinburg (USA), May 9-13, 1994.

*Pairing correlations by a quantum Monte Carlo approach,*

Contributed talk, International Nuclear Physics Conference (INPC'95), Beijing (China), August 21-26, 1995.

*Negative entropy in quantum information theory,*

Contributed talk, 2nd International Symposium on Fundamental Problems in Quantum Physics, Oviedo (Spain), July 21-26, 1996.

*Quantum information theory of entanglement,*

Contributed talk, 4th Workshop on Physics and Computation (PhysComp96), Boston (USA), November 22-24, 1996.

*Mutual entanglement and loss of a noisy quantum channel,*

Poster (N. Cerf), Conference on Quantum Coherence and Decoherence, ITP, University of California at Santa Barbara (USA), December 15-18, 1996.

*Monte Carlo simulation of quantum computation,*

Contributed talk, IMACS conference on Monte Carlo methods, Bruxelles, April 1-3, 1997.

*Quantum cloning and the uncertainty principle: Pauli cloning machines in all dimensions,*

Talk in the session on "Quantum communication and computation: applications and future", International Workshop on the Physics of Quantum Information, Helsinki (Finland), September 24-26, 1998.

*Universal copying of coherent states: a Gaussian cloning machine,*

Poster (N. Cerf and S. Iblisdir), 5th International Conference on Quantum Communication, Measurement and Computing (QCMC'00), Capri, Italy, July 3-8, 2000.

*Optimal cloning of conjugate quantum variables,*

Talk in the working group session on "Qubit and Entanglement Manipulation", 1st European QIPC workshop, Potsdam, Germany, September 27-29, 2000.

*Quantum distribution of Gaussian keys,*

Talk in the working group session on "Quantum Cryptography and Quantum Communications", 1st European QIPC workshop, Potsdam, Germany, September 27-29, 2000.

*Conditional generation of large photon-number path entanglement using linear optics,*

Poster (N. Cerf, J. Fiurasek, S. Iblisdir, and S. Massar), 6th International Conference on Quantum Communication, Measurement and Computing (QCMC'02), Massachusetts Institute of Technology, Boston, USA, July 22-26, 2002.

*High-rate continuous variable quantum cryptography using Gaussian modulated light pulses,*

Talk in the "Hot Topics" session, 3rd European QIPC Workshop, Trinity College, Dublin, Ireland, September 15-18, 2002.

*Cloning the entanglement of a pair of quantum bits,*

Poster (L.-Ph. Lamoureux, P. Navez, and N. J. Cerf), Advances in Quantum Information Processing: from theory to experiments, Ettore Majorana Centre for Scientific Culture, Erice, Italy, March 15-22, 2003.

*Quantum search by local adiabatic evolution,*

Poster (J. Roland and N. J. Cerf), Advances in Quantum Information Processing: from theory to experiments, Ettore Majorana Centre for Scientific Culture, Erice, Italy, March 15-22, 2003.

*Entanglement-enhanced classical capacity of Bosonic Gaussian channels with memory*,  
Poster (N. J. Cerf, J. Clavareau, C. Macchiavello, and J. Roland), 5th European Quantum Information Processing and Communication Workshop, Roma, Italy, September 20-22, 2004.

*Entanglement-enhanced classical capacity of Bosonic Gaussian channels with memory*,  
Contributed talk, Workshop on "Quantum entanglement in physical and information sciences", Pisa, Italy, December 14-18, 2004.

*Quantum entanglement can be simulated without communication*,  
Contributed talk, 9th Workshop on Quantum Information Processing, Paris, France, January 16-20, 2006.

*Quantum non-locality without squeezing*,  
Poster (J. Niset and N.J. Cerf), 6th Workshop on Continuous-Variable Quantum Information Processing, University of St-Andrews, Scotland, UK, April 13-16, 2007.

*Enforcing the tolerance to noise of a quantum key distribution protocol with continuous variables*,  
Poster (R. García-Patrón, E. Karpov, and N.J. Cerf), QIPC International Conference on Quantum Information Processing and Communications (Barcelona, Spain, October 15-19, 2007).

*Experimentally feasible quantum erasure-correcting code for continuous variables*,  
Poster (J. Niset, U.L. Andersen, and N.J. Cerf), QIPC International Conference on Quantum Information Processing and Communications (Barcelona, Spain, October 15-19, 2007).

*Enforcing the tolerance to noise of a quantum key distribution protocol with continuous variables*,  
Poster (E. Karpov, R. García-Patrón, and N. J. Cerf), Information and Complexity @ Quantum Scale, (Erice, Sicily, Italy, November 4-10, 2007).

*Bounds on the non-Gaussianity of mixed quantum states with positive Wigner functions*,  
Poster (A. Mandiara, E. Karpov, J. Niset, and N. J. Cerf), First Solvay Workshop on "Bits, Quanta, and Complex Systems", (Brussels, April 30 – May 3, 2008).

11th International Conference on Squeezed states and Uncertainty relations and 4th Feynman festival, Olomouc, Czech Republic, June 22–26, 2009.

Contributed talk: *Continuous-variable quantum error correction: possibilities and impossibilities*.

International Conference on Quantum Information and Communication (QIPC'11),  
ETH Zurich, Switzerland, September 5-9, 2011.

Contributed talk: *Probabilistic (Heralded) Phase-insensitive Optical Squeezer*

11<sup>th</sup> International Conference on Quantum Communication, Measurement and Computing (QCMC 2012),  
Vienna, Austria, 30 July – 3 August, 2012.

Contributed talk (delivered by R. García-Patrón): *The Holy Grail of Quantum Optical Communication*

2<sup>nd</sup> Annual Conference on Quantum Cryptography (QCRYPT 2012),  
Singapore, September 10-14, 2012.

Contributed talk (delivered by A. Leverrier): *Security of continuous-variable quantum key distribution against general attacks*.

### **Selected popularizing science tutorials**

Séminaire "Ils cherchent près de chez vous", ULB, November 17, 1998. Popularizing science talk: *Des quanta et des bits: les curiosités de l'information à l'échelle atomique*.

Les après-midi de nos recherches (ARAMIS), ULB, December 15, 1998. Popularizing science talk: *Des quanta et des bits : les curiosités de l'information à l'échelle atomique*.



Information day for secondary school teachers (physics), Theme: "Optique et transmission de l'information", ULB, November 15, 2000. Talk: *Des quanta et des bits*.

Jeunesses scientifiques, ULB, March 24, 2001. Popularizing science talk: *Le monde des q-bits, ou les promesses spectaculaires de l'information quantique*.

Centre de culture scientifique de Parentville, ULB, March 26, 2002. Popularizing science conference (co-presented with Prof. Y. Roggeman) for secondary school classes : *Information, transmission et sécurité : de l'arithmétique aux quanta*.

Technopol Bruxelles, Contact Day "Photons, réseaux photoniques et cryptographie", ULB, April 18, 2002. Talk: *La cryptographie quantique*.

Séminaire de Physique de l'Ecole Polytechnique, ULB, November 15, 2007.  
Talk : *Le monde des bits quantiques*

Institut des Hautes Etudes Scientifiques de Belgique, October 14, 2008.  
Conférence : *Cryptographie et calcul quantique*

Collège Belgique (Royal Academies for Science and the Arts of Belgium)  
Responsable du cycle de 4 cours (8h) : *Introduction à l'information et au calcul quantique* (2009)  
(co-enseigné avec P. Grangier et F. Magniez)