



CURRICULUM VITAE

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Personal information

- Born : Uccle (Belgium), April 8, 1965
- Citizenship : Belgian
- Married, 3 children

Education

- 1987 M. Eng. in Electronics and Telecommunication (5-year programme), ULB, with highest honors.
1988 M. Sc. in Theoretical Physics, ULB, with highest honors.
1993 Ph. D. in Physics, ULB, with highest honors.
Thesis : *Nuclear level densities, pairing correlations, and their role in Astrophysics.*
1995 Habilitation to teach at university level (“Agrégation de l’enseignement supérieur”), ULB.
Thesis : *Monte Carlo methods : application to the study of quantum systems.*

Employment history

- 1988-1993 Ph. D. student in Physics, ULB
(Note : it includes a 1-year leave of absence for compulsory military service.)
1993-1995 Postdoctoral research associate, Department of Theoretical Physics, University of Paris XI, Orsay (France).
1995-1998 Postdoctoral research fellow (2y) and senior research fellow (1y), Division of Quantum Information and Computation, California Institute of Technology, Pasadena (USA).
1998-present Associate Professor, Ecole Polytechnique de Bruxelles, ULB. Promoted to Full Professor in 2009. Teaching Information & Coding Theory, and Quantum Mechanics.
2001-present Director of the Centre for Quantum Information and Communication (QuIC), ULB.

Fellowships

- FNRS research fellowship (“Aspirant”), Fonds National de la Recherche Scientifique, 1988-1993.
- Marie Curie individual fellowship, European Commission, 1993-95.
- Caltech research fellow / senior research fellow, California Institute of Technology, 1995-98.
- NATO grant for scientific research, 1996.

Awards, prizes, and honors

- Caltech President’s Fund Award (California Institute of Technology), 1997.
- Alcatel-Bell Scientific Prize (awarded by the FNRS), 1999.
- Fulbright Advanced Research/Lecturing Award, 1999.
- Prize of the Wernaers Fund (awarded by the FNRS), 2000.
- Marie Curie excellence award (awarded by the EC), 2006.
- Nominated by the Grand Jury for the Descartes Prize for Transnational Collaborative Research as the coordinator of the European FP6 project COVAQIAL, 2007.
- Elected member of the Royal Academies for Science and the Arts of Belgium, 2009.

Visiting positions

- Visiting Professor, Institute for Quantum Information, California Institute of Technology (USA), regular one-month visits in Summer 1999, 2000, 2001, 2002, 2003, 2004, 2005, and 2007.
- Visiting Associate, Information and Computing Technologies Research Section, JPL, NASA (USA), from August 5 to October 23, 1999; one-month visits in Summer 2000, 2001, and 2002.
- Visiting Professor at the Institut Henri Poincaré (Paris) from January 9 to February 3, 2006, invited to give a course in the programme “*Quantum information, computation and complexity*”.
- Visiting Professor at the Katholieke Universiteit Leuven, April 3 – 14, 2006, invited to give a course on “*Quantum optics and quantum information*”.
- Professor of the course “*Introduction à l’information quantique et au calcul quantique*”, 2009, Collège Belgique (Royal Academies for Science and the Arts of Belgium).
- Visiting Professor (sabbatical semester) at the Center for Extreme Quantum Information Theory, Massachusetts Institute of Technology, Cambridge (USA), from November 2008 to February 2009 (4 months) and from September 2010 to January 2011 (5 months).

Scientific production

- Author of 134 articles in peer-reviewed journals, including 32 letters in *Physical Review Letters*, 2 papers in *Reviews of Modern Physics*, 1 paper in *IEEE Transactions on Information Theory*, 2 letters in *Nature Photonics*, and 1 letter in *Nature* (received > 400 citations ISI Web of Science and was ranked by ISI in the top 1% of the most influential articles within its field). Author of 6 book contributions, including a chapter in the first book devoted to *Quantum information with continuous variables* published by *Kluwer* (2002).
- Co-editor of a book on this topic published by *Imperial College Press* (2007).
- Author of 8 popular science articles, including 5 in the renowned French magazine *La Recherche* (1 in a special issue devoted to Einstein’s legacy and the year of physics 2005, and 2 in a special column treating *Quantum teleportation*, co-signed with G. Brassard, C. Crépeau, and N. Gisin).
- Co-author of 2 patents.
- Presented ca. 50 invited talks and numerous contributed talks at international conferences, including several guest lectures or courses at international schools or training workshops (e.g., Les Houches, Cargèse, Obergurgl, Newton Institute in Cambridge, ICTP Trieste, EMFCSC Erice).

Bibliometry

- h-index: 40 (ISI Web of Science) or 49 (Google scholar).
- total number of citations > 5500 (ISI Web of Science) or > 9500 (Google scholar).
- average citations per paper > 35 (ISI Web of Science).

Conference organization

- Co-founder and organizer of the first international conference devoted to *Quantum information with continuous variables*, CVQIP’02, Brussels, April 2002. This initiated a series of conferences (CVQIP’03 Aix-en-Provence, CVQIP’04 Veilbronn, CVQIP’05 Prague, CVQIP’06 Copenhagen, CVQIP’07 St Andrews, CVQIP’10 Ammersee near Munich, CVQIP’11 Paris, CVQIP’12 Frederiksdal near Copenhagen, CVQIP’13 Paris). Was co-organizer of all these conferences.
- Co-organizer of the *ESF exploratory workshop on Long-distance Quantum Communication Networks with Atoms and Light*, Prague, Czech Republic, April 9-12, 2005.
- Co-organizer of the *26th Symp. on Information Theory in the Benelux*, Brussels, May 19-20, 2005.
- Co-organizer of the special session on *Quantum Optics and Quantum Information*, ICO Topical Meeting on Optoinformatics/Information Photonics, IV International Optical Congress « Optics – XXI Century », St-Petersbourg, Russia, September 4-7, 2006.
- Chair of the first *Solvay Workshop on Bits, Quanta, and Complex Systems: Modern approaches to photonic information processing*, organized by the International Solvay Institutes and held at the Palace of the Royal Academies for Science and the Arts, Brussels, April 30 to May 3, 2008.
- Co-chair of *21st Central European Workshop on Quantum Optics*, Brussels, Belgium, June 23-27, 2014.

Selected peer-reviewed publications

Research articles

- *Negative entropy and information in quantum mechanics*,
N. J. Cerf and C. Adami, Phys. Rev. Lett. 79 (1997) 5194.
... 171 citations ISI [main contributor]
- *Optical simulation of quantum logic*,
N. J. Cerf, C. Adami, and P. G. Kwiat, Phys. Rev. A 57 (1998) 1477(R).
... 92 citations ISI [main contributor]
- *Reduction criterion for separability*,
N. J. Cerf, C. Adami, R. M. Gingrich, Phys. Rev. A 60 (1999) 898.
... 96 citations ISI [main contributor]
- *Pauli cloning of a quantum bit*,
N. J. Cerf, Phys. Rev. Lett. 84 (2000) 4497.
... 162 citations ISI
- *Cloning of continuous quantum variables*,
N. J. Cerf, A. Ipe, and X. Rottenberg, Phys. Rev. Lett. 85 (2000) 1754.
... 153 citations ISI [leader]
- *Asymmetric quantum cloning in any dimension*,
N. J. Cerf, J. Mod. Opt. 47 (2000) 187.
... 136 citations ISI
- *Quantum distribution of Gaussian keys using squeezed states*,
N. J. Cerf, M. Levy, and G. Van Assche, Phys. Rev. A 63 (2001) 052311.
... 110 citations ISI [main contributor]
- *Security of quantum key distribution using d-level systems*,
N. J. Cerf, M. Bourennane, A. Karlsson, N. Gisin, Phys. Rev. Lett. 88 (2002) 127902.
... 372 citations ISI [main contributor]
- *Quantum search by local adiabatic evolution*,
J. Roland and N. J. Cerf, Phys. Rev. A 65 (2002) 042308.
... 169 citations ISI [leader]
- *Quantum key distribution using Gaussian-modulated coherent states*,
F. Grosshans, G. Van Assche, J. Wenger, R. Brouri, N. J. Cerf, P. Grangier, Nature 421 (2003) 238.
... 408 citations ISI [theory leader]
... was topic of a News and Views: M. Hillery, Nature 421 (2003) 224.
- *Proposal for a loophole-free Bell test using homodyne detection*,
R. Garcia-Patron, J. Fiurasek, N. J. Cerf, J. Wenger, R. Tualle-Brouri, P. Grangier,
Phys. Rev. Lett. 93 (2004) 130409.
... 122 citations ISI [theory leader]
- *Unconditional optimality of Gaussian attacks against continuous-variable QKD*,
R. Garcia-Patron and N. J. Cerf, Phys. Rev. Lett. 97 (2006) 190503.
... 107 citations ISI [leader]
- *Ultimate classical communication rates of quantum optical channels*,
V. Giovannetti, R. Garcia-Patron, N. J. Cerf, and A. S. Holevo, Nature Photonics 8 (2014) 796.
[equal contributions from all authors]

Review articles

- *The security of practical quantum key distribution*,
V. Scarani, H. Bechmann-Pasquinucci, N. J. Cerf, M. Dušek, N. Lütkenhaus, and M. Peev,
Rev. Mod. Phys. 81 (2009) 1301.
... 361 citations ISI
- *Gaussian quantum information*,
C. Weedbrook, S. Pirandola, R. Garcia-Patron, N. J. Cerf, T. C. Ralph, J. H. Shapiro, and S. Lloyd,
Rev. Mod. Phys. 84 (2012) 621.
... 187 citations ISI

Research leader, scientific responsibilities

- Director of the *Centre for Quantum Information and Communication* (QulC) since 2001, a research group of more than 10 people (it was the first established Belgian group active in this field). The centre QulC authors 2 papers in Nature, 2 in Nature Photonics, and 1 in Nature Communications.
- Advisor of 7 Ph.D. theses (+ 3 at present). After graduation, the Ph.D. students have been offered postdocs in many international groups (Université de Genève, University of Barcelona, California Institute of Technology, ICFO-Barcelona, Université de Paris XI-Orsay, University of California Berkeley, NEC-Princeton, STMicroelectronics, Massachusetts Institute of Technology, CUNY-City University of New York, Max Planck Institute for Quantum Optics MPQ-Garching).
- Supervisor of 10 post-doctoral researchers (+ 5 at present).
- Advisor of ca. 20 Ms. theses and co-advisor of 4 Ms. theses (1 at Vrije Universiteit Brussels, 2 at Ghent University, 1 at Ecole Normale Supérieure in Lyon, France, and 1 at Johannes Gutenberg University in Mainz, Germany).
- Examiner in the thesis committees of > 20 Ph.D. students, in Belgium and abroad.
- Belgian member of the steering committee of the scientific programme *Quantum information theory and quantum computation*, funded by the European Science Foundation (1999-2004).
- Belgian member of the governing board of the European Coordinating Action QUROPE (*Quantum Information Processing and Communication in Europe*), 2006-2009.
- Belgian member of the scientific board of the European Coordination Action QUIE²T (*Quantum Information Entangled-Enables Technologies*), 2010-2013.

Partnership in European projects:

- QUIPROCONE (*Quantum Information Processing and Communications Network of Excellence*); Grant: IST-1999-29064, from 2000 to 2004
- EQUIP (*Entanglement in Quantum Information Processing and Communication*)
Grant: IST-1999-11053, from 01/01/2000 to 31/12/2002
- CHIC (*Consortium for Hamiltonian Intra-molecular Computing*)
Grant: IST-2001-32150, from 01/07/2002 to 30/06/2006
- RESQ (*Resources for Quantum Computation*)
Grant: IST-2001-37559, from 01/01/2003 to 31/12/2005
- SECOQC (*Development of a Global Network for Secure Communication based on Quantum Cryptography*)
Integrated Project (IP): IST-2002-506813, from 01/04/2004 to 31/03/2008
- COVAQIAL (*Continuous Variable Quantum Information with Atoms and Light*)
Specific Targeted Research Project (STREP): FP6-511004, from 01/09/2004 to 31/08/2007
Role: coordinator (total budget = 1.4 M€)
- QAP (*Qubit Applications*)
Integrated Project (IP): from 01/11/2005 to 30/10/2009
- QUROPE (*Quantum Information Processing and Communication in Europe*)
Coordinated Action (CA): from 01/09/2006 to 31/08/2009
- COMPAS (*Computing with Mesoscopic Photonic and Atomic States*)
Specific Targeted Research Project: FP7-ICT-2007-C-212008, from 01/04/2008 to 31/03/2011
Role: coordinator (total budget = 1.6 M€)
- HIPERCOM (*High-performance coherent quantum communications*)
Era-Net, European coordinated research on long-term challenges in ICST, 01/09/2011-31/08/2014.
Role: coordinator (total budget = 1.2 M€)

Funding from Belgian institutions:

- FNRS: 1 individual grant (“Crédit aux chercheurs”), 1998-1999.
- FNRS: 5 grants (“Conventions FRFC”), 2000-2001, 2002-2007, 2008-2011, 2011-2014, 2013-2017.
- ULB: 3 grants (“Fonds d’Encouragement pour la Recherche – FER”), 2000, 2003, 2008.
- Brussels-Capital Region: 1 grant (“LINK”), 1999-2003.
- French Community: 2 grants (“Action de Recherche Concertée” – ARC), 2000-2005, 2012-2017.
- Federal Science Policy: 3 grants (“Inter-University Attraction Pole” – IAP), PHOTON 2002-2006, Photonics@be 2007-2011, and Photonics@be 2012-2017.
- Brussels Region: 3 grants. Coordinator of project “CRYPTASC” within “ICT Impulse Program” involving 4 teams, from 01/09/2007 to 31/08/2013 (total budget = 2.2 M€). Scientific advisor of 2 other projects within “Prospective Research in Brussels” and “Spin-off in Brussels”.

Technology transfer, links with industry

- Co-inventor of a patent on a high-rate quantum key distribution scheme using coherent light states. A prototype of this invention, adapted to telecom wavelengths, was tested in the laboratory of the company *Thales* and was proven to be a successful QKD platform in project SECOQC (quantum metropolitan-area network demonstration, Vienna, 2008). An improved version is commercialized by the company *SeQureNet*, a spin-off of Telecom Paristech.
- Principal investigator of the project "LINK" with the support of the company *Proton Technologies* (now *STMicroelectronics*), specialized in security and cryptography applications. An engineer of the company, G. Van Assche, was a Ph.D. student (half-time) at QuIC. His thesis manuscript was published as a book by *Cambridge University Press* (2006).
- Was in charge of presenting a synthesis on quantum information for the *Observatoire Français des Techniques Avancées* (OFTA); Progress report on nanosciences and nanotechnologies to the attention of the technology and industry communities: ARAGO n°26, "Nano-composants et nano-machines" (éditions Tec&Doc, 2000).
- Responsible for a project "Spin-off in Brussels" with 2 former Ph.D. students (L.-P. Lamoureux and J. Niset), which led to the creation of the company *SQR Technologies*, a spin-off of ULB in 2010.

Role in increasing the public awareness of science

- Presented many scientific popularizing seminars on *quantum information science* for different public: secondary school students, undergraduate students, physics teachers at secondary school, industry, and general public.
- Was interviewed by *Radio France Internationale* (Paris) on January 21, 2000; programme "Le Monde Change" by Patrick Chompré.
- Was interviewed by Belgian national TV news (*Journal Télévisé, RTBF*) on April 18, 2005; by Pascale Bollekens.
- Was interviewed by *Radio France Internationale* (Paris) on April 28, 2005; programme "Le Monde Change" by Patrick Chompré.
- Was interviewed by *France Info* on May 12, 2005, and on August 25, 2005; chronique "Profession chercheur" by Marie-Odile Monchicourt.
- Was interviewed by Belgian national radio (*La Première, RTBF*) on December 4, 2005, and on December 11, 2005; programme "Semences de curieux" by Jacques Olivier.
- Was interviewed by Denis Delbecq in *La Recherche*, n° 455, September 2011, « Un nouveau monde quantique », p. 48-50.
- Was interviewed by Azar Khalatbari in *Sciences et Avenir*, n°776, October 2011, « Une piste pour les ordinateurs du futur », p. 24.

The prize *La Recherche 2004* was awarded to 5 Ph.D. students of the centre QuIC (supervisor N. J. Cerf) and the Institut d'Optique d'Orsay (supervisor P. Grangier) for the joint work of the two teams on quantum cryptography.

Miscellaneous

- Serving as a referee for several scientific journals, including *Nature*, *Science*, *Physical Review*, and *Physical Review Letter*.
- Serving as an evaluator for several organizations, including the European Commission and the Agence Nationale de la Recherche (France).
- Member of the international programme committee of several scientific conferences.
- Member of the Belgian Physical Society (BPS), European Physical Society (EPS), Euroscience (founding member), American Association for the Advancement of Science (AAAS), Institute of Electrical and Electronics Engineers (IEEE), and Marie-Curie Fellows Association (MCFA).
- Co-founded the *Antonella Karlson Prize* in exact sciences (managed by FNRS).