Lorenzo Maccone's Curriculum Vitæ

with a statement of research interest and a list of publications

Lorenzo Maccone, born in Ivrea (TO) –Italy– on April 21, 1972 (Italian citizen).

Contact information

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Education / Academia (inverse chronological ordering)

January 2005-now (Winter 2007): **Contract Professor** at the University of Pavia (contract of 4 years), primarily devoting to research on **quantum information, foundations of quantum mechanics and quantum optics**. In addition, he is part of the Didactic Council and performs the normal duties of a professor (i.e. exams, diploma exams, students tutoring, etc.). In the academic years 2004/2005, 2005/2006, and 2006/2007 he has tought the following courses:

- the full **course of "Quantum Optics"** (5 credits). It is primarily directed to Physics students, and is basically an advanced quantum mechanics course (with special emphasis on the quantum optics techniques).
- the section on **"Foundations of Quantum Mechanics"** (2 credits out of 5) in the course of "Epistemology of Physics" (converted to "Foundations of Physics" in the academic year 2006/2007). It is an introductory course on quantum mechanics and is followed by Physics and Math students.

March 2004-December 2004: **Postdoctoral Associate** in the Quantum Information theory group of the Università di Pavia, the group of Prof. G. M. D'Ariano.

November 2000-February 2004: **Postdoctoral Associate** in the Research Laboratory of Electronics of the Massachusetts Institute of Technology (MIT) in the groups of Prof. J. H. Shapiro and Prof. S. Lloyd. This position was renewed three times: in November 2001, November 2002, and November 2003.

January 2000-November 2000: **Postdoctoral fellowship** for the PAIS project in the Quantum Optics and Information Group of Prof. G. M. D'Ariano in Pavia University.

September 1996-December 13, 1999: **Ph.D. in Physics** (theoretical physics) in Pavia under the supervision of Prof. G. M. D'Ariano. Thesis "Quantum tomography: methods and applications", in which the theory and various applications of quantum state reconstruction techniques are analyzed.

September 1992-June 7, 1996: **Master in Physics** obtained with full marks (110 on 110) *cum laude* and an average mark of 29.77 on 30 for the eighteen required exams. Master thesis

"Amplificazione laser sotto il limite standard quantistico" (*i.e.* Laser amplification under the standard quantum limit), in which the laser dynamical equations are numerically studied.

High School: Liceo Classico (Liceo "C. Botta", Ivrea), where literary and humanistic subjects are emphasized. Final score: 60 on 60 (full marks).

Publications: numerous publications on peer-reviewed international scientific journals—Nature, Science, and Phys. Rev. Lett. among others (see full list of publications below). Referee for the journals Science, IEEE Photonics Technology Letters, Phys. Rev. A, Phys. Rev. Lett., Quantum Information and Computation, Physics Letters, New Journal of Physics, Journal of Physics A: Mathematical and General, Journal of Physics B: Atomic, Molecular & Optical Physics, European Physical Journal D.

Foreign languages: English, fluent (5 years of permanence in the USA, TOEFL score 640); French, fair.

Computer skills: started programming in 1981; programming languages: C, Fortran, Assembler 8086, and Basic; Latex typesetting language; Operating systems: Unix (Linux), MS-DOS, and Windows (from 2.0 to XP); system administrator for linux and mixed linux-windows computer clusters, web servers, mail servers, FTP servers, samba servers, and a domain name server; architectures: IBM compatibles, Sun Sparc, and DEC Alpha.

Scientific conferences and workshops: international scientific conferences with presentation of research in oral or poster form:

2008: three weeks invitation at the Massachusetts Institute of Technology for a research project (Cambridge MA, January 6-February 1).

2007: three weeks invitation at the Massachusetts Institute of Technology for a research project (Cambridge MA, January 7-February 2); *Quantum Information and Many-Body Quantum Systems* (Pisa, March 26-31) **(oral presentation)**; *first Quantumbionet Workshop* (Pavia University, May 25, 2007) **(invited oral presentation)**; *Vienna Symposium on the Foundations of Modern Physics* (Vienna, Austria, June 7–10); *Pedro Pascual Benasque Center for science. Quantum Information* (Benasque, Spain, June 11-20); *Photons, Atoms and Qubits 2007 – PAQ07* (Royal Society, London, United Kingdom, September 2-5); *International Iran Conference on Quantum Information – IICQI* (Kish, Iran, September 7-10) **(invited oral presentation)**; *Noise Information & Complexity @ Quantum Scale* (Centro Ettore Majorana, Erice, Italy, November 4-10) **(oral presentation)**.

2006: *Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons*, (Torino, May 2-5) **(Oral presentation)**; *XI International Conference on Quantum Optics ICQO'2006*, (Minsk, Belarus, May 26-31) **(invited oral presentation)**; *Foundations of Probability and Physics-4*,(Växjö, Sweden, June 4-9, 2006) **oral presentation**; *QUPREST 2006, Focus meeting: quantum process estimation*, (Budmerice, Slovakia, September 27–October 1) **(invited oral presentation)**; *QCM&C 2006* (Tsukuba, Japan, November 28– December 3); Quantum information seminar in Hiroshima (Hiroshima University, December 8) **(invited oral presentation)**.

2005: *Frisno8, 8th French-Israeli symposium on nonlinear optics* (Ein Bokek, Israel, February 20-25) **(oral presentation)**; *Quantum Information Benasque workshop* (Benasque, Spain, June 12-25); Seminari di Quantum Information (Milano, October 28) **(invited oral presentation)**.

2004: *International DFG Workshop on Quantum Entanglement - from Error Correction to Secure Key Distribution* (Hirschegg, Austria, March 30 - April 2) **(invited oral presentation)**; *Foundations of Quantum Information* (Camerino, April 16-19); 2nd Workshop ad memoriam of Carlo Novero "Advances in Foundations of Quantum Mechanics and Quantum Information with atoms and photons" (Torino, April 26); *X International Conference on Quantum Optics* (Minsk, Belarus, May 30-June 3) **(invited oral presentation)**; *5th European QIPC Workshop* (Roma, September 20-22); *Mini workshop on Quantum Open Systems* (Pavia, Italy, October 25-26). Cambridge, Pisa.

2003: *Advances in Quantum Information Processing: from theory to experiment* (Erice, Italy, March 15-22); *8^{th} International Conference on Squeezed States and Uncertainty Relations* (Puebla, Mexico, June 9-13); *Third annual MIT/NU MURI workshop* (Cambridge MA, USA, July 10-11); *QIT-EQIS ERATO conference on quantum information science* (Kyoto, Japan, September 2-6) **(oral presentation)**; *3^{rd} Annual MIT-Cambridge Quantum Information Workshop* (Cambridge MA, USA, October 2-3).

2002: *Quantum Information Quantum Entanglement – Euroconference* (San Feliu de Guixols, Spain, March 23-28); *Second annual MIT/NU MURI workshop* (Northwestern University, Evanston IL, USA, 11 April); *IX international conference on quantum optics 2002* (Raubichi, Belarus, May 14-17) **(invited oral presentation)**; *II Cambridge-MIT Quantum Information Workshop* (Cambridge, UK, June 13-14) **(oral presentation)**; *Progress in Electromagnetics Research Symposium: Quantum computation session* (Cambridge MA, USA, July 5); *QCM&C 2002* (Cambridge MA, USA, July 22-26); *MIT/NU MURI review workshop* (Cambridge MA, USA, October 23); *NASA-DoD workshop on quantum Imaging and Metrology* (Pasadena CA, USA November 14-15) **(invited oral presentation).**

2001: *7th International Conference on Squeezed States and Uncertainty Relations ICSSUR2001* (Boston MA USA, June 4-8); *CQO8: 8^{th} Rochester Conference on Coherence & Quantum Optics* and *ICQI2001: International Conference on Quantum Information* (Rochester NY USA, June 10-16) **(oral presentation)**; *Mysteries, Puzzles and Paradoxes in Quantum Mechanics* (Gargnano Italy, August 27-September 1); *Quantum Optics – EuroConference* (San Feliu de Guixols, Spain, October 06-11).

2000: *Seventh central-european workshop on quantum optics* (Balatonfured Hungary, April 28 - May 1); *QCM&C Y2K* (Capri Italy, 3-8 July); *Mysteries, puzzles and paradoxes in Quantum Mechanics* (Gargnano Italy, September 17-23); *Quantum Optics XI – EuroConference* (Palma Spain, October 14-19).

1999: *III Adriatico research conference on quantum interferometry* (Trieste Italy, March 1-5); *Fundamental Problems in Quantum Theory Workshop* (Baltimore MD USA, August 9-13).

1997: *II Working Party on Quantum Optics and Quantum Computation* (at the Scuola Normale di Pisa, Pisa, June 26-28); *LXXXIII congresso nazionale Società Italiana di Fisica, Congresso del Centenario* (Villa Olmo Como Italy, October 27-31).

Scholarships: three scholarships from the private institution INPDAI for study achievements.

MISCELLANEA:

Sports: mountain sports (alpine ski, trekking, free climbing, *piolet traction*, mountain biking), sailing, swimming. No health problems and good physical shape.

Sailing: provisional rating and experience on a 38-foot vessel.

Hobbies: computers and electronics (radio amateur license I-W1ETZ).

Civil service: EMT-trained ambulance technician (with "Croce Verde Fornovese" in Fornovo, PR). He has fulfilled the mandatory military requirements for his country.

Statement of Research Interest and Research Activities

I am a theoretical physicist, mainly interested in the study of fundamental aspects and of practical applications of Quantum Mechanics. My research activity has been chiefly devoted to quantum optics, quantum theory of measurement and quantum information theory. A schematic list of the research topics I pursued, or I am currently pursuing, follows. The references refer to the publications in the subsequent list. The research has been performed in collaboration with numerous coauthors.

- Numerical simulations: Monte-Carlo simulations of laser master and Fokker Plank equations [1], Monte-Carlo simulations of numerous tomographic schemes.

- Quantum state reconstruction: theoretical analysis and proposal of tomographic procedures for optical systems [3,5] and systems with SU(1,1) and SU(2) symmetries [16,25], contribution to generalized tomography [14,15], application of quantum tomography to classical imaging [46].

- Experimental proposals: Liouvillian superoperator measurement [3,4], optical Schrödinger cat [5], optical Fock state synthesis-measurement [12,13].

- Entanglement, uses: quantum clock synchronization with dispersion cancellation [18], dynamical evolution of composite systems [27,28], conversion between speakable and unspeakable information [64].

- Entanglement, new sources: difference-beam state [20,24].

- Quantum-channel capacities: entanglement assisted capacity of bosonic channels [29,31], classical capacity of bosonic and Gaussian channels [32], waveguide capacity [35], ultimate limits to channel capacity [39].

- Clock synchronization: conveyor belt clock synchronization protocol [40], limits to synchronization in the presence of decoherence [21].

- Quantum parameter estimation: quantum positioning [17], quantum metrology [51,41], interferometric tunability of the absorption [53], quantum telescope [65].

- Quantum foundations: information-disturbance tradeoffs [52,56], quantum thermodynamics [71].

- Quantum computation: quantum solution to the Ulam problem [50,70], quantum Random Access Memory [60], quantum optical computation [9].

- Quantum cryptography: quantum cryptographic ranging [22], quantum cryptographic protocol for the communication of reference frames [57], secure database interrogation, the QPQ cryptographic primitive [59].

In addition to the above research, I have also devoted some effort to the divulgation of Quantum Physics [54,63,62].

Patents

- "Quantum private queries": a protocol for privately querying a database. Provisional patent application filed on July 3, 2007.
- "Quantum random access memories and method and apparatus for addressing a random access memory": a protocol and a procedure for programming the decoding operation in random access memories (RAMs). Provisional patent application filed on July 3, 2007.

Publications

1. G. M. D'Ariano, C. Macchiavello, L. Maccone, *"Noise, errors and information in quantum amplification",* Int. J. Mod. Phys. B **11**, 3385 (1997).
2. G. M. D'Ariano and L. Maccone, *"Quantum Tomography of Optical Devices",* in *5th International Conference on Squeezed States and Uncertainty Relations*, ed. by J. Janszky, Y. S. Kim, and V. I. Man'ko, p. 529 (1997).
3. G. M. D'Ariano, L. Maccone, *"Measuring Quantum Optical Hamiltonians",* Phys. Rev. Lett. **80**, 5465 (1998).
4. G. M. D'Ariano and L. Maccone, *"Quantum characterization of optical devices",* Fortschr. Phys. **46**, 6 (1998).
5. G. M. D'Ariano, C. Macchiavello, and L. Maccone, *"Quantum tomography of mesoscopic superpositions of radiation states",* Phys. Rev. A **59**, 1816 (1999).
6. G. M. D'Ariano, P. Kumar, C. Macchiavello, L. Maccone, and N. Sterpi, *"A Test of the State Reduction Rule",* Phys. Rev. Lett. **83**, 2490 (1999).
7. G. M. D'Ariano, A. Garuccio, L. Maccone, and M. F. Sacchi, *"Tomographic test of Bell's inequality",* J. Opt. B, **1**, 576 (1999).
8. G. M. D'Ariano, L. Maccone, M. G. A. Paris and M. F. Sacchi, *"Generation and measurement of nonclassical states by quantum Fock filter",* Acta Phys. Slov. **49**, 659 (1999).
9. G. M. D'Ariano, C. Macchiavello, and L. Maccone, *"Quantum Computation with Polarized Photons",* Fortschr. Phys. **48**, 573 (2000).
10. G. M. D'Ariano, L. Maccone, M. F. Sacchi and A. Garuccio, *"Homodyning Bell's inequality",* in '4^{th} Int. Conf. on Quantum Communication, Measurement, and Computing', Kluwer/Plenum, pg. 163 (2000).
11. G. M. D'Ariano, L. Maccone, M. G. A. Paris and M. F. Sacchi, *"State preparation by photon filtering",* Fortschr. Phys. **48**, 671 (2000).
12. G. M. D'Ariano, L. Maccone, M. G. A. Paris, and M. F. Sacchi, *"Optical Fock-state synthetizer",* Phys. Rev. A, **61**, 053817 (2000).
13. G. M. D'Ariano, L. Maccone, M. G. A. Paris and M. F. Sacchi, *"State measurement by photon filtering in a ring cavity",* Mod. Phys. Lett. B **14**, 15 (2000).

14. G. M. D'Ariano, L. Maccone and M. G. A. Paris, *"Orthogonality relations in Quantum Tomography",* Phys. Lett. A **276**, 25 (2000).

15. G. M. D'Ariano, L. Maccone, M. G. A. Paris *"Quorum of observables for universal quantum estimation",* Journ. of Phys. A **34**, 93 (2001).

16. G. M. D'Ariano, E. De Vito, and L. Maccone, *"SU(1,1) tomography",* Phys. Rev. A **64**, 033805 (2001).

17. V. Giovannetti, S. Lloyd, and L. Maccone, *"Quantum-enhanced positioning and clock syncronization",* Nature **412**, 417 (2001).

18. V. Giovannetti, S. Lloyd, L. Maccone, and F. N. C. Wong, *"Clock synchronization with dispersion cancellation",* Phys. Rev. Lett. **87**, 117902 (2001).

19. V. Giovannetti, S. Lloyd, and L. Maccone, *"Positioning and clock synchronization through entanglement",* Phys. Rev. A **65**, 022309 (2002).

20. V. Giovannetti, S. Lloyd, L. Maccone, J. Shapiro, and F. N. C. Wong, *"Generating entangled two-photon states with coincident frequencies",* Phys. Rev. Lett. **88**, 183602 (2002).

21. V. Giovannetti, S. Lloyd, L. Maccone, and S. M. Shahriar, *"Limits to clock synchronization induced by completely dephasing communication channels",* Phys. Rev. A **65**, 062319(2002).

22. V. Giovannetti, S. Lloyd, and L. Maccone, *"Quantum cryptographic ranging",* J. Opt. B: Quantum Semiclass. Opt. **4**, S413 (2002).

23. V. Giovannetti, S. Lloyd, L. Maccone, and F. N. C. Wong, *"Clock synchronization and dispersion",* J. Opt. B: Quantum Semiclass. Opt. **4**, S415, (2002).

24. V. Giovannetti, L. Maccone, J. Shapiro, and F. N. C. Wong, *"Extended phase-matching conditions for improved entanglement generation",* Phys. Rev. A **66**, 043813 (2002).

25. G. M. D'Ariano, L. Maccone, M. Paini, *"Spin tomography",* J. Opt. B: Quantum Semiclass. Opt. **5**, 77 (2003).

26. V. Giovannetti, S. Lloyd, and L. Maccone, *"The quantum speed limit"* in 'Fluctuations and Noise in Photonics and Quantum Optics', edited by D. Abbott, J. H. Shapiro, and Y. Yamamoto, proc. of the SPIE, **5111**, 1 (2003).

27. V. Giovannetti, S. Lloyd, and L. Maccone, *"Quantum limits to dynamical evolution",* Phys. Rev. A **67**, 052109 (2003).

28. V. Giovannetti, S. Lloyd, and L. Maccone, *"The role of entanglement in dynamical evolution",* Europhys. Lett. **62**, 615 (2003).

29. V. Giovannetti, S. Lloyd, L. Maccone, and P. Shor, *"Entanglement assisted capacity of the broadband lossy channel",* Phys. Rev. Lett. **91**, 047901 (2003).

30. V. Giovannetti, L. Maccone, J. H. Shapiro, and F. N. C. Wong, *"Maximal entanglement generation via pulsed parametric downconversion",* in *6^{th} International Conference on Quantum Communication Measurement and Computing*, (Rinton Press, Princeton NJ, 2003), pg. 163.

31. V. Giovannetti, S. Lloyd, L. Maccone, and P. Shor, *"Broadband channel capacities",* Phys. Rev. A **68**, 062323 (2003).

32. V. Giovannetti, S. Guha, S. Lloyd, L. Maccone, J. H. Shapiro, and H. P. Yuen, *"Classical Capacity of the lossy bosonic channel: the exact solution",* Phys. Rev. Lett. **92**, 027902 (2004).

33. V. Giovannetti, S. Lloyd, and L. Maccone, *"Quantum positioning system",* in *Coherence and Quantum Optics VIII* pg. 303, Proceedings of the 8^{th} Rochester Conference, ed. N. P. Bigelow, J. H. Eberly, C. R. Stroud, and I. A. Walmsley (Kluwer Academic, New York, 2003).

34. V. Giovannetti, S. Lloyd, and L. Maccone, *"The speed limit of quantum unitary evolution",* "Special Issue on Fluctuations & Noise in Photonics & Quantum Optics" of J. Opt. B: Quantum Semiclass. Opt. **6**, S807 (2004) (Hermann Haus memorial special issue).

35. V. Giovannetti, S. Lloyd, L. Maccone, and J. H. Shapiro, *"Information rate of a waveguide",* Phys. Rev. A **69**, 052310 (2004).

36. V. Giovannetti, S. Guha, S. Lloyd, L. Maccone, and J. H. Shapiro, *"Minimum output entropy of bosonic channels: a conjecture",* Phys. Rev. A **70**, 032315 (2004).

37. V. Giovannetti, S. Lloyd, L. Maccone, J. H. Shapiro, and B. J. Yen, *"Minimal Rényi and Wehrl entropies at the output of bosonic channels",* Phys. Rev. A **70**, 022328 (2004).

38. V. Giovannetti, S. Lloyd, and L. Maccone, *"Capacity of nonlinear bosonic systems",* Phys. Rev. A **70**, 012307 (2004).

39. S. Lloyd, V. Giovannetti, and L. Maccone, *"Physical limits to communication",* Phys. Rev. Lett. **93**, 100501 (2004).

40. V. Giovannetti, S. Lloyd, L. Maccone, J. Shapiro, and F. Wong, *"Conveyor belt clock synchronization"*, Phys. Rev. A **70**, 043808 (2004).

41. V. Giovannetti, S. Lloyd, and L. Maccone, *"Quantum-enhanced measurements: beating the standard quantum limit",* Science **306**, 1330 (2004).

42. V. Giovannetti, S. Guha, S. Lloyd, L. Maccone, J. H. Shapiro, and B. J. Yen, *"Minimum output entropy of a gaussian bosonic channel"* proceedings of FQI04, International Journal of Quantum Information **3**, No. 1, 153-158 (2005).

43. G. M. D'Ariano, P. Lo Presti, and L. Maccone, *"Quantum Calibration"*, Phys. Rev. Lett. **93**, 250407 (2004).

44. V. Giovannetti, S. Guha, S. Lloyd, L. Maccone, J. H. Shapiro, B. J. Yen, and H. P. Yuen, *"Classical Capacity of Free-Space Optical Communication",* in *Quantum Information, Statistics, Probability, dedicated to A. S. Holevo on the occasion of his* 60^{th} *birthday*, edited by O. Hirota (Rinton Press, 2004), pg. 90. Published also as Quantum Information and Computation, **4**, 489 (2005).

45. V. Giovannetti, S. Guha, S. Lloyd, L. Maccone, J. H. Shapiro, B. J. Yen, and H. P. Yuen, *"Information capacity of bosonic channels",* in Proceedings of the International Symposium on Information Theory (*ISIT 2004*), IEEE Conference Proceedings pg. 325 (2004).

46. G. M. D'Ariano, L. Maccone, *"Quantum Tomography for Imaging",* Electronic Notes in Discrete Mathematics, **20**, 133 (2005), Proceedings of the Workshop on Discrete Tomography and its Applications 13-15 June 2005 Ed. G. T. Herman; A. Kuba.

47. G. M. D'Ariano, L. Maccone, and M. F. Sacchi, *"Homodyne tomography and the reconstruction of quantum states of light",* in "Quantum Information with Continuous Variables of Atoms and Light", Ed. N. Cerf, G. Leuchs, and E. Polzik (World Scientific Press, London, 2007).

48. J. H. Shapiro, V. Giovannetti, S. Guha, S. Lloyd, L. Maccone, and B. J. Yen, *"Capacity of Bosonic Communications",* S. M. Barnett, E. Anderson, J. Jeffers, P. Öhberg, and O. Hirota, eds., *Proceedings of the Seventh International Conference on Quantum Communication, Measurement and Computing* (American Institute of Physics, New York, 2004), pg. 15.

49. V. Giovannetti, S. Guha, S. Lloyd, L. Maccone, J. H. Shapiro, and B. J. Yen, *"Minimum bosonic channel output entropies",* S. M. Barnett, E. Anderson, J. Jeffers, P. Öhberg, and O. Hirota, eds., *Proceedings of the Seventh International Conference on Quantum Communication, Measurement and Computing* (American Institute of Physics, New York, 2004), pg. 21.

50. S. Mancini, L. Maccone, *"Using Quantum Mechanics to Cope with Liars",* Int. J. Quantum Inf. **3**, 729 (2005).

51. V. Giovannetti, S. Lloyd, L. Maccone, *"Quantum metrology",* Phys. Rev. Lett. **96**, 010401 (2006). [This paper was highlighted in Nature's "News and Views": S. L. Braunstein, Nature **440**, 617 (2006), which is dedicated to our paper.]

52. L. Maccone, *"Information-disturbance tradeoff in quantum measurements",* Phys. Rev. A **73**, 042307 (2006).

53. V. Giovannetti, S. Lloyd, and L. Maccone, *"Interferometric tunability of the absorption",* Opt. Express **14**, 8622 (2006).

54. S. Mancini, L. Maccone, *"Una strategia per Geppetto",* italian didactic version of [70], Sapere October 2006, pg. 78 (2006).

55. M. Razavi, V. Giovannetti, L. Maccone, and J. H. Shapiro, *"Hot-cavity loading: A Heisenberg-Langevin analysis",* in *Quantum Electronics and Laser Science Conference, Technical Digest:QFA7*, Long Beach, CA, (2006).

56. L. Maccone, *"Entropic information-disturbance tradeoff",* Europhys. Lett. **77**, 40002 (2007).

57. G. Chiribella, L. Maccone, P. Perinotti, *"Secret communication of a reference frame",* Phys. Rev. Lett. **98**, 120501 (2007).

58. L. Maccone, *"A quantification of disturbance",* in *Foundations of Probability and Physics-4*, Eds. G. Adenier, C. A. Fuchs, A. Yu. Khrenikov (AIP Conference Proceedings, Melville NY, 2007).

—— Papers in progress (NOT YET PUBLISHED): ——

59. V. Giovannetti, S. Lloyd, L. Maccone, *"Private quantum queries"*, unpublished (2007) arXiv:0708.2992 [quant-ph].

60. V. Giovannetti, S. Lloyd, L. Maccone, *"Quantum random access memory"*, unpublished (2007) arXiv:0708.1879 [quant-ph]. New Scientist news service reviewed this article (even before it was published) in Stephen Battersby, NewScientist.com news service, http://technology.newscientist.com/article/dn12516-blueprints-drawn-up-for-quantum-computer-ram.html This preprint also made slashdot.org on August 23 (2007).

61. V. Giovannetti, S. Lloyd, L. Maccone, *"Quantum random access memory: the bucket brigade protocol"*, unpublished (2007).

62. L. Maccone, *"Il Gatto di Schrödinger"* (a didactic explanation of the Schrödinger's cat paradox, analyzed from a modern perspective), under consideration on "Sapere".

63. L. Maccone, *"Meccanica Quantistica: Un Approccio Contemporaneo", i.e. "Quantum Mechanics, a contemporary approach"*, chapter for the italian book for Carocci Editor, presumably titled "Fisica moderna: dalla relatività ai sistemi complessi", i.e. "Modern physics: from relativity to complex systems", unpublished (2006).

64. G. Chiribella, V. Giovannetti, L. Maccone, P. Perinotti, *"Quantum teleportation of clocks and gyroscopes"*, unpublished (2007).

65. V. Giovannetti, S. Lloyd, L. Maccone, *"Quantum microscopes"*, in progress (2008).

66. V. Giovannetti, S. Lloyd, L. Maccone, *"Quantum limits in the accuracy of time-keeping"*, in progress (2008).

67. V. Giovannetti, S. Guha, S. Lloyd, L. Maccone, Si Hui Tan, J. H. Shapiro, *"Quantum illumination",* in progress (2008).

68. Si-Hui Tan, Baris I. Erkmen, Vittorio Giovannetti, Saikat Guha, Seth Lloyd, Lorenzo Maccone, and Jeffrey H. Shapiro, *"Quantum Illumination: enhanced background-limited target detection by means of entanglement",* paper for the ICQI08 conference, *Quantum Entanglement and Decoherence: 3rd International Conference on Quantum Information* (2008).

69. V. Giovannetti, S. Lloyd, L. Maccone, *"Quantum internet routers"*, in progress (2008).

70. S. Mancini, L. Maccone, *"Exposing lies through quantum mechanics",* unpublished (2006).

71. L. Maccone, *"A quantum solution to the arrow-of-time dilemma"*, in progress.

72. S. Lloyd, V. Giovannetti, L. Maccone, *"Physical limits to communication, reply",* submitted to Phys. Rev. Lett. (2005).

73. V. Giovannetti, L. Maccone, *"Entangled lithography and microscopy",* unpublished (2005).

74. V. Giovannetti, L. Maccone, *"Quantum internet: cavity loading study",* unpublished (2004).