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SCIENTIFIC PUBLICATIONS

Last Update: February 2022

Thesis:

1. *"From Vacuum Fluctuations to Radiation: Pair Creation in the Presence of External Electric Fields, Accelerated Detectors, Accelerated Mirrors and Black Holes."*

   Thesis presented to obtain the degree of doctor in science, June 1995, Université Libre de Bruxelles, Promotor: Prof. R. Brout.

2. *"Quantum Information Theory"*

   Thesis presented to obtain the title of Agrégé de l'Enseignement Supérieur, March 2003, Université Libre de Bruxelles.

Patents:

1. *"Handling Information in a Noisy Environment"*

   N. Gisin, N. Linden, S. Massar, S. Popescu - United States Patent 7,266,303 issued in 2007 - Japan Patent 2002-533523 and PCT patent application 01972283.4-2415-GB0104392

2. *"Reducing depolarisation"*

   S. Massar et S. Popescu - United States Patent 7,565,037 issued in 2009.

Scientific publications in refereed journals:

1. *"On the problem of the uniformly accelerated observer"*

   S. Massar, R. Parentani, R. Brout - Class. Q. Grav 10 (1993) 385.

2. ***"Energy-momentum tensor of the evaporating black hole and local Bogoljubov transformations"***

    S. Massar, R. Parentani, R. Brout - Class. Q. Grav 10 (1993) 2431

3. ***"Source vacuum fluctuations of black hole radiance"***

    Englert, S. Massar, R. Parentani - Class. Q. Grav.11 (1994) 2919.

4. ***"Local modes, local vacuum, local Bogoljubov coefficients and the renormalized stress tensor"***

    S. Massar - Int. J. Mod. Phys. D 3 (1994) 237

5. ***"Optimal extraction of information from finite quantum ensembles"***

    S. Massar, S. Popescu - Phys. Rev. Lett. 74 (1995) 1259

6. ***"Quantum source of the back reaction on a classical field"***

    R. Brout, S. Massar, R. Parentani, S. Popescu, Ph. Spindel - Phys. Rev. D 52 (1995) 1119

7. ***"A Primer for Quantum Black Hole Physics"***

    R. Brout, S. Massar, R. Parentani, Ph. Spindel - Phys. Repts. 260 (1995) 329

8. ***"Hawking radiation without transplanckian frequencies"***

    R. Brout, S. Massar, R. Parentani, Ph Spindel - Phys. Rev. D 52 (1995) 4559

9. ***"Semi-classical back reaction to black hole evaporation"***

    S. Massar - Phys. Rev. D 52 (1995) 5857

10. ***"Adiabatic measurements on metastable systems"***

    Y. Aharonov, S. Massar, S. Popescu, J. Tollaksen, L. Vaidman - Phys. Rev. Lett. 77 (1996) 983

11. ***"Applications of the complex geometric phase for meta-stable systems"***

    S. Massar - Phys. Rev. A 54 (1996) 4770

12. ***" From vacuum fluctuations to radiation: I - accelerated detectors"***

    S. Massar, R. Parentani - Phys. Rev. D 54 (1996) 7426

13. ***"From vacuum fluctuations to radiation: II - black holes"***

    S. Massar, R. Parentani - Phys. Rev. D 54 (1996) 7444

14. ***"Black hole horizon fluctuations"***

Casher, F. Englert, N. Itzhaki, S. Massar, R. Parentani - Nucl. Phys. B 484 (1997) 419

15. ***"Schwinger mechanism, the Unruh effect and the production of accelerated black holes"***

R. Parentani, S. Massar - Phys. Rev. D 55 (1997) 3603

16. ***Comment on "Vanishing Hawking Radiation from a Uniformly Accelerated Black Hole"***

P. Yi, Phys. Rev. Lett. 75 (1995) 382
S. Massar, R. Parentani - Phys. Rev. Lett. 78 (1997) 4526

17. ***"Gravitational Instanton for Black Hole Radiation"***

S. Massar, R. Parentani - Phys. Rev. Lett. 78 (1997) 3810

18. ***"Optimal Quantum Cloning Machines"***

N. Gisin, S. Massar - Phys. Rev. Lett. 79 (1997) 2153

19. ***"Particle Creation and Nonadiabatic Transitions in Quantum Cosmology"***

S. Massar, R. Parentani - Nucl. Phys. B 513 (1998) 375

20. ***"Interacting Charged Particles in an Electric Field and the Unruh Effect"***

C. Gabriel, P. Spindel, S. Massar, R. Parentani - Phys. Rev. D 57 (1998) 6496

21. ***"Purifying Noisy Entanglement Requires Collective Measurements"***

N. Linden, S. Massar, S. Popescu - Phys. Rev. Lett. 81 (1998) 3279

22. ***"Optimal Quantum Clocks"***

V. Buzek, R. Derka, S. Massar - Phys. Rev. Lett. 82 (1999) 2207

23. ***"Unitary and Non Unitary Evolution in Quantum Cosmology"***

S. Massar, R. Parentani - Phys. Rev. D 59 (1999) 123519

24. ***"Optimal Entanglement Enhancement for Mixed States"***

A. Kent, N. Linden, S. Massar - Phys. Rev. Lett 83 (1999) 2656

25. ***"Classical Teleportation of a Quantum Bit"***

N. J. Cerf, N. Gisin, S. Massar - Phys. Rev. Lett. 84 (2000) 2521

26. ***"State Estimation for Large Ensembles"***

R. D. Gill, S. Massar - Phys. Rev. A 61 (2000) 042312

27. ***"How the Change in Horizon Area Drives Black Hole Evaporation"***

S. Massar, R. Parentani - Nucl. Phys. B 575 (2000) 333

28. ***"Amount of Information Obtained by a Quantum Measurement"***

S. Massar, S. Popescu - Phys. Rev. A 61 (2000) 062303

29. ***"Collective versus local measurements on two parallel or antiparallel spins"***

S. Massar - Phys. Rev. A 62(2000) 040101(R)

30. ***"Absorption Free discrimination between Semi-Transparent Objects"***

G. Mitchison, S. Massar - Phys. Rev. A 63, (2001) 032105

31. ***"Classical Simulation of Quantum Entanglement Without Local Hidden Variables"***

S. Massar, D. Bacon, N. Cerf, R. Cleve - Phys. Rev. A 63 (2001) 052305

32. ***"Compression of quantum measurement operations"***

A.Winter, S. Massar - Phys. Rev. A 64 (2001) 012311

33. ***"Optimal cloning of coherent states with a linear amplifier and beam splitter"***

Samuel L. Braunstein, Nicolas J. Cerf, Sofyan Iblisdir, Peter van Loock, Serge Massar
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34. ***"Optimality of the genetic code with respect to protein stability and amino acid frequencies"***

D. Gilis, S. Massar, N. Cerf, M Rooman - Genome Biology 2(11): research0049 (2001)

35. ***"Minimal Absorption Measurements"***

S. Massar, G. Mitchison, S. Pironio - Phys. Rev. A 64 (2001) 062303

36. ***"Greenberger-Horne-Zeilinger paradox for continuous variables"***

S. Massar, S. Pironio - Phys. Rev. A 64 (2001) 062108

37. *"Minimum number of photons needed to distinguish two transparencies"*

G. Mitchison, S. Massar, S. Pironio - Phys. Rev. A 65 (2002) 022110

38. *"Bell inequalities for arbitrarily high dimensional systems"*

D. Collins, N. Gisin, N. Linden, S. Massar, S. Popescu - Phys. Rev. Lett. 88 (2002) 040404

39. *"Greenberger-Horne-Zeilinger paradoxes for many audits"*

N. J. Cerf, S. Massar, S. Pironio - Phys. Rev. Lett. 89 (2002) 080402

40. *"Non locality, closing the detection loophole and communication complexity"*

S. Massar - Phys. Rev. A 65 (2002) 032121

41. *"Quantum cloning of orthogonal cubits"*

J. Fiurasek, S. Iblisdir, S. Massar, N.J. Cerf - Phys. Rev. A 65 (2002) 040302(R)

42. *"Multipartite classical and quantum secrecy monotones"*

N. J. Cerf, S. Massar, S. Schneider - Phys. Rev. A 66 (2002) 042309

43. *"Measuring Energy, Estimating Hamiltonians, and the Time-Energy Uncertainty Relation"*

Y. Aharonov, S. Massar, S. Popescu - Phys. Rev. A 66 (2002) 052107

44. *"Bell inequalities resistant to detector inefficiency"*

S. Massar, S. Pironio, J. Roland, B. Gisin - Phys. Rev. A 66, 052112 (2002)

45. *"Continuous-Variable Quantum Games"*

Hui Li, Jiangfeng Du, Serge Massar - Phys. Lett. A 306 (2002) 73

46. *"Generating a Superposition of Spin States in an Atomic Ensemble"*

S. Massar, E. S. Polzik - Phys. Rev. Lett. 91, 060401-1 (2003)

47. *"Fiber-Optics implementation of the Deutsch-Jozsa and Bernstein-Vazirani Quantum Algorithms with Three Qubits"*

E. Brainis, L.-P. Lamoureux, N. J. Cerf, Ph. Emplit, M. Haelterman, S. Massar
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48. *"Conditional generation of arbitrary multimode entangled states of light with linear optics"*

J. Fiurasek, S. Massar, N. J. Cerf - Phys. Rev. A 68, 042325 (9) (2003)

49. *"Violation of local realism versus detection efficiency"*

S. Massar, S Pironio - Phys. Rev. A 68, 062109 (7) (2003)

50. *"Combinatorics and Quantum Nonlocality"*

Harry Buhrman, Serge Massar, Hein Roehrig - Phys. Rev. Lett. 91, 047903(4) (2003)

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52. *"Quantum cloning of orthogonal qubits"*

J. Fiurasek, S. Iblisdir, S. Massar, N.J. Cerf - Fortschr. Phys. 51, No. 2-3, 117-121 (2003)

53. *"Quantum Coin Tossing and Bit-String Generation in the Presence of Noise"*

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54. *"Security of quantum bit-string generation"*

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55. *"Quantum fingerprinting with a single particle"*

S. Massar - Phys. Rev. A 71, 012310(5) (2005)

56. *"Provably Secure Experimental Quantum Bit-String Generation"*

L-P. Lamoureux, E. Brainis, D. Amans, J. Barrett, S. Massar - Phys. Rev. Lett. 94, 050503(4) (2005)

57. *"Scalar and vector modulation instabilities induced by vacuum fluctuations in fibers: Numerical study"*

E. Brainis, S. Massar, and D. Amans - Phys. Rev. A 71, 023808(13) (2005)

58. *"Nonlocal correlations as an information-theoretic resource"*

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59. *"Extent of multiparticle quantum Nonlocality"*

N. S. Jones, N. Linden, S. Massar - Phys. Rev. A 71, 042329(10) (2005)

60. *"Measurement of the total energy of an isolated system by an internal observer"*

S. Massar, S. Popescu - Phys. Rev. A **71**, 042106(6) (2005)

61. ***"Vector modulation instability induced by vacuum fluctuations in highly birefringent fibers in the anomalous-dispersion regime"***

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62. ***"Simulating Maximal Quantum Entanglement without Communication"***

    N.J. Cerf, N. Gisin, S. Massar, S. Popescu - Phys. Rev. Lett. 94, 220403 (2005)

63. ***"Experimental Error Filtration for Quantum Communication Over Highly Noisy Channels"***

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64. ***"Error Filtration and Entanglement Purification for Quantum Communication"***

    N. Gisin, N. Linden, S. Massar, S. Popescu - Phys. Rev. A 72, 012338 (2005)

65. ***"Quantum gloves: Quantum states that encode as much as possible chirality and nothing else"***

    D. Collins, L. Diósi, N. Gisin, S. Massar, and S. Popescu - Phys. Rev. A 72, 022304 (2005)

66. ***"Quantum computing on lattices using global two-qubit gates"***

    G. Ivanyos, S. Massar, and A. B. Nag - Phys. Rev. A 72, 022339 (2005)

67. ***"Causality and Tsirelson's bounds"***

    H. Buhrman and S. Massar - Phys. Rev. A 72, 052103 (2005)

68. ***"Lower Bound on the Number of Toffoli Gates in a Classical Reversible Circuit through Quantum Information Concepts"***

    S. Popescu, B. Groisman, and S. Massar - Phys. Rev. Lett. 95, 120503 (2005)

69. ***"Higher order harmonics of modulational instability"***

    David Amans, Edouard Brainis and Serge Massar - Phys. Rev. E 72, 066617 (2005)

70. ***"Quantum Information processing and communication, Strategic Report on current status, visions and goals for research in Europe"***

    P. Zoller, Th. Beth, D. Binosi, R. Blatt, H. Briegel, D. Bruss, T. Calarco, J.I. Cirac, D. Deutsch, J. Eisert, A. Ekert, C. Fabre, N. Gisin, Ph. Grangier, M. Grassl, S. Haroche, A. Imamoglu, A. Karlson, J. Kempe, L. Kouwenhoven, S. Kröll, G. Leuchs, M. Lewenstein, D. Loss, N. Lütkenhaus, S. Massar, J.E. Mooij, M.B. Plenio, E. Polzik, S. Popescu, G. Rempe, A. Sergienko, D. Suter, J. Twamley, G. Wendin, R. Werner, A. Winter, J. Wrachtrup and A. Zeilinger - Eur. Phys. J. D 36, 203-228 (2005)

71. *"Multipartite nonlocal quantum correlations resistant to imperfections"*

H. Buhrman, P. Høyer, H. Röhrig, and S. Massar - Phys. Rev. A 73, 012321 (2006)

72. *"Efficient quantum key distribution secure against no-signalling eavesdroppers"*

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73. *"Enhanced cross phase modulation instability in birefringent photonic crystal fibers in the anomalous dispersion regime"*

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74. *"Fiber Optics Protocols for Quantum Communication"*

Serge Massar - Quantum Information Processing 5, 441-449 (2006)

75. *"Einstein-Podolsky-Rosen correlations between two uniformly accelerated oscillators"*

S. Massar and P. Spindel - Phys. Rev. D 74, 085031 (2006)

76. *"Photon pair source based on parametric fluorescence in periodically poled twin-hole silica fiber"*

Kien Phan Huy, Anh Tuan Nguyen, Edouard Brainis, Marc Haelterman, Philippe Emplit, Costantino Corbari, Albert Canagasabey, Peter G. Kazansky, Olivier Deparis, Andrei A. Fotiadi, Patrice Mégret, and Serge Massar - Opt. Express 15, 4419-4426 (2007)

77. *"Device-Independent Security of Quantum Cryptography against Collective Attacks"*

Antonio Acin, Nicolas Brunner, Nicolas Gisin, Serge Massar, Stefano Pironio, and Valerio Scarani Phys. Rev. Lett. 98, 230501 (2007)

78. *"Reducing Polarization Mode Dispersion with Controlled Polarization Rotations"*

S. Massar and S. Popescu - New J. Phys. 9, 158 (2007)

79. *"Spontaneous Growth of Raman Stokes and Anti-Stokes Waves in Fibers"*

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80. *"Uncertainty Relations for Positive Operator Valued Measures"*

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81. *"Uncertainty Relation for the Discrete Fourier Transform"*

Serge Massar and Philippe Spindel - Phys. Rev. Lett. 100, 190401 (2008)

82. *"Experimental Quantum Tossing of a Single Coin"*

A. T. Nguyen, J. Frison, K. Phan Huy and S. Massar - New J. Phys. 10, 083037 (13pp) (2008)

83. *"Device-independent quantum key distribution secure against collective attacks"*

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84. *"Continuous wave photon pair generation in silicon-on-insulator waveguides and ring resonators"*

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85. *"The first peptides: the evolutionary transition between prebiotic amino acids and early proteins"*

Peter van der Gulik, Serge Massar, Dimitri Gilis, Harry Buhrman, Marianne Rooman - Journal of Theoretical Biology 261, 531-539 (2009)

86. *"Device independent state estimation based on Bell's inequalities"*

C-E. Bardyn, T. C. H. Liew, S. Massar, M. McKague, V. Scarani - Phys. Rev. A 80, 062327 (8pp) (2009)

87. *"Non-locality and Communication Complexity"*

H. Buhrman, R. Cleve, S. Massar, R. de Wolf - Rev. Mod. Phys. 82, pp. 665-698, 2010

88. *"Random Numbers Certified by Bell's Theorem"*

S. Pironio*, A. Acin*, S. Massar*, A. Boyer de la Giroday, D. N. Matsukevich, P. Maunz, S. Olmschenk, D. Hayes, L. Luo, T. A. Manning and C. Monroe - Nature 464, pp. 1021-1024, 2010
*These authors contributed equally to this work.

89. *"Frequency Bin Entangled Photons"*

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90. *"Generation of correlated photons in hydrogenated amorphous-silicon waveguides"*

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91. ***"Family of loss-tolerant quantum coin-tossing protocols"***

N. Aharon, S. Massar, J. Silman - Phys. Rev. A 82, 052307 (2010)

92. ***"On-chip parametric amplification with 26.5 dB gain at telecommunication wavelengths using CMOS-compatible hydrogenated amorphous silicon waveguides"***

Bart Kuyken, Stéphane Clemmen, Shankar Kumar Selvaraja, Wim Bogaerts, Dries Van Thourhout, Philippe Emplit, Serge Massar, Gunther Roelkens, and Roel Baets - Optics Letters 36, 552-554 (2011)

93. ***"Fully Distrustful Quantum Bit Commitment and Coin Flipping"***

J. Silman, A. Chailloux, N. Aharon, I. Kerenidis, S. Pironio and S. Massar - Phys. Rev. Lett. 106, 220501 (2011)

94. ***"Information processing using a single dynamical node as complex system"***

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95. ***"Estimating preselected and postselected ensembles"***

Serge Massar and Sandu Popescu - Phys. Rev. A 84, 052106 (10pp) (2011)

96. ***"Nonlinear properties of and nonlinear processing in hydrogenated amorphous silicon waveguides"***

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98. ***"Optoelectronic Reservoir Computing"***

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99. ***"Implementing two-photon interference in the frequency domain with electro-optic phase modulators"***

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100. ***"Z-scan measurement of the nonlinear refractive index of graphene"***

Han Zhang, Stéphane Virally, Qiaoliang Bao, Loh Kian Ping, Serge Massar, Nicolas Godbout, and Pascal Kockaert - Optics Letters 37, pp. 1856–1858 (2012) - Erratum: Optics letters 38 (9), 1566-1566

101. ***"Low-power inelastic light scattering at small detunings in silicon wire waveguides at telecom wavelengths"***

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103. ***"All Optical Reservoir Computing"***

François Duport, Bendix Schneider, Anteo Smerieri, Marc Haelterman, Serge Massar - Optics Express 20, 22783 (2012)

104. ***"Security of practical private randomness generation"***

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105. ***"Mean field theory of echo state networks"***

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106. ***"Device-Independent Randomness Generation in the Presence of Weak Cross-Talk"***

J. Silman, S. Pironio, S. Massar - Phys. Rev. Lett. 110, 100504 (5 pages) (2013)

107. ***« Silicon-on-insulator integrated source of polarization-entangled photons"***

L Olislager, J Safioui, S Clemmen, KP Huy, W Bogaerts, R Baets, P Emplit, S. Massar - Optics letters 38, 1960-1962 (2013)

108. ***« No-go theorems for ψ-epistemic models based on a continuity assumption"***

M. K. Patra, S. Pironio, S. Massar **-** Physical Review Letters 111, 090402 (2013)

109. ***Comment on "Ultra-short pulse generation by a topological insulator based saturable absorber*** **[Appl. Phys. Lett. 101, 211106 (2012)]**

Jassem Safioui, François Bernard, Maïté Swaelens, Serge Massar, Pascal Kockaert, Philippe Emplit and Simon P. Gorza - Appl. Phys. Lett.103, 106101 (2013)

110. ***"Experimental refutation of a class of ψ-epistemic models"***

M. K. Patra, L. Olislager, F. Duport, J. Safioui, S. Pironio, and S. Massar - Phys. Rev. A 88, 032112 (2013)

111. ***"Supercontinuum generation in hydrogenated amorphous silicon waveguides at telecommunication wavelengths"***

Jassem Safioui, François Leo, Bart Kuyken, Simon-Pierre Gorza, Shankar Kumar Selvaraja, Roel Baets, Philippe Emplit, Gunther Roelkens, and Serge Massar - Optics Express Vol. 22, Iss. 3, pp. 3089–3097 (2014)

112. ***"Secure and Robust Transmission and Verification of Unknown Quantum States in Minkowski Space"***

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113. ***"All-optical reservoir computer based on saturation of absorption"***

Antoine Dejonckheere, François Duport, Anteo Smerieri, Li Fang, Jean-Louis Oudar, Marc Haelterman, and Serge Massar - Optics Express, Vol. 22 Issue 9, pp.10868-10881 (2014)

114. ***"Information and communication in polygon theories"***

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115. ***"Creating and manipulating entangled optical qubits in the frequency domain"***

Laurent Olislager, Erik Woodhead, Kien Phan Huy, Jean-Marc Merolla, Philippe Emplit, and Serge Massar - Phys. Rev. A 89, 052323 (2014) (8 pages)

116. ***"Generalized probabilistic theories and conic extensions of polytopes"***

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117. ***"High performance photonic reservoir computer based on a coherently driven passive cavity"***

Quentin Vinckier, François Duport, Anteo Smerieri, Kristof Vandoorne, Peter Bienstman, Marc Haelterman, Serge Massar - Optica 2, pp. 438-446 (2015)

118. ***"Propagation and survival of frequency-bin entangled photons in metallic nanostructures"***

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119. ***"Exponential Lower Bounds for polytopes in Combinatorial Optimization"***

Samuel Fiorini, Serge Massar, Sebastian Pokutta, Hans Raj Tiwary, Ronald de Wolf - Journal of the ACM (JACM) 62, Article 17, (2015)

120. ***"Investigating the emergence of time in stationary states with trapped ions"***

Serge Massar, Philippe Spindel, Andrés F. Varon, Christof Wunderlich, Phys. Rev. A 92, 030102(R) (2015)

121. *"Hyperdense coding and superadditivity of classical capacities in hypersphere theories"*

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122. *"Device-independent bit commitment based on the CHSH inequality"*

N. Aharon, S. Massar, S. Pironio, J. Silman - New J. Phys. 18 (2016) 025014

123. *"Fully analogue photonic reservoir computer"*

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François Duport, Akram Akrout, Anteo Smerieri, Marc Haelterman, Serge Massar - Journal of Lightwave Technology 89 (2016) ; DOI 10.1109/JLT.2016.2524559

125. **"Nonlinear optical interactions in silicon waveguides"**

B. Kuyken, F. Leo, S. Clemmen, U. Dave, H. Zhao, S. Holzner, T. Ideguchi, X. liu, J. Safioui, M. Yan, S. Coen, W. Green, S. Gorza, T. Hansch, S. Selvaraja, S. Massar, N, Picque, R. Osgood, P. Verheyen, J. Van Campenhout, R. Baets, G. Roelkens - Nanophotonics 5, 1-16 (2016)

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