

CURRICULUM VITAE -- CRISTINA MASOLLER

Contact Information

Address Department de Física i Enginyeria Nuclear ([DFEN](#)),
Escola Tècnica Superior d'Enginyeries Industrial i
Aeronàutica de Terrassa ([ETSEIAT](#)),
Universitat Politècnica de Catalunya ([UPC](#))
Colom 11, Terrassa 08222, Barcelona, Spain



Email: cristina.masoller@upc.edu, cristina.masoller@gmail.com

Web page: www.fisica.edu.uy/~cris

ORCID: [0000-0003-0768-2019](https://orcid.org/0000-0003-0768-2019)

Google scholar: <http://scholar.google.com/citations?user=esTS9GsAAAAJ>

Research Gate: https://www.researchgate.net/profile/Cristina_Masoller/?ev=hdr_xprf

Areas of Interest:

Complex systems, nonlinear dynamics, photonics and semiconductor lasers, vertical-cavity surface-emitting lasers (VCSELs), optical feedback, optical injection, polarization switching, extreme events and optical rogue waves, excitable systems, time-delayed systems, bi-stability, multi-stability and hysteresis, synchronization of chaotic systems, climate networks, nonlinear time-series analysis, symbolic ordinal analysis, stochastic phenomena, stochastic and coherent resonance, logic stochastic resonance and optical stochastic logic gates.

Education

1986–1989: Bachelor in Physics, [Universidad de la República](#), Montevideo, Uruguay.

1989–1991: Master in Physics, [Universidad de la República](#), Montevideo, Uruguay.

1996–1999: Doctorate PhD degree, [Bryn Mawr College](#), Pennsylvania, USA.

Thesis: *Nonlinear Dynamics in Semiconductor Lasers with Optical Feedback*, directed by Prof. Neal B. Abraham.

Appointments

May 2009 – to date: Associated Professor (permanent position, full-time), DFEN, ETSEIAT, UPC. Research group: Dinamica, Optica NoLineal i Laseres (DONLL).

2004 – May 2009: “Ramon i Cajal” Researcher (five-year contract, full-time) UPC.

2003 – 2004: Associate Professor (permanent position, full-time), [Physics Department, Faculty of Science, Universidad de la República](#) (UDELAR), Uruguay.

1993 – 2003: Assistant Professor (permanent position, full-time), Physics Department, Faculty of Science, UDELAR, Uruguay.

1986 – 1993: Teaching assistant, Physics Department, UDELAR, Uruguay.

Teaching

- 1986 – 2004: Courses taught at the [Physics Department](#), UDELAR, Uruguay
Undergraduate courses (for Bachelor degree): General Physics, Electromagnetism, Thermodynamics, Classical Mechanics, Laser Dynamics.
Master course (for MsC degree in physics): Electromagnetic Theory.
Graduate course (for PhD degree in physics): Nonlinear Optics.
- 2004 – to date: *Undergraduate courses* (for the Industrial Engineering and Aeronautic Engineering degrees) at [ETSEIAT](#), UPC, Terrassa: Physics I: Statics and Dynamics; Physics II: Oscillations, Waves and Thermodynamics, Physics III: Electromagnetism.
- 2007 – to date: *Master courses* for the [BCN Master in Photonics](#) program (offered by UB, UAB, UPC and ICFO): Electromagnetic Waves (with S. Bosch in 2007, with M. Montes in 2008 and 2009 -discontinued), Computing in Photonics (with A. Carnicer, R. Herrero in 2010-2013 -discontinued), Laser Systems and Applications (with F. Vega and others, 2012 and 2013).

Honors and Awards

- 2009: [ICREA Academia Award](#), [Institució Catalana de Recerca i Estudis Avançats](#)
- 2008: Program I3, Certificación de Trayectoria Investigadora Destacada, Agencia Nacional de Evaluación y Prospectiva (ANEP), Madrid, Spain 23/10/2008.
- 2003–2008: Associate Researcher of the Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy.
- 2002–2004: Researcher Level II, National Research Council (Fondo Nacional de Investigadores), Montevideo, Uruguay.
- 2002–2004: Researcher Level I, National Research Council (Fondo Nacional de Investigadores), Montevideo, Uruguay.

Member of Professional Societies

European Physical Society
Optical Society of America
Sociedad Uruguaya de Física

Publications

1. [C. Masoller](#), A. Sicardi, and L. Romanelli, "*Regular and chaotic behavior in the new Lorenz system*", Phys. Lett. A **167**, 185-190 (1992). [Download](#)
2. [C. Masoller](#), A. Sicardi, and C. Cabeza, "*Chaotic properties of the coherence collapsed state of laser diodes with optical feedback*", Opt. Commun. **100**, 331-340 (1993). [Download](#)
3. [C. Masoller](#), "*Coexistence of attractors in a laser diode with optical feedback from a large external cavity*", Phys. Rev. A **50**, 2569-2578 (1994). [Download](#)
4. [C. Masoller](#), A. Sicardi, and L. Romanelli, "*Characterization of strange attractors of Lorenz's model of general circulation of the atmosphere*", Chaos, Solitons & Fractals **6**, 357-366 (1995). [Download](#)

5. C. Masoller, A. Sicardi, and C. Cabeza, "The nonlinear gain and the onset of chaos in a semiconductor laser with optical feedback", *Chaos, Solitons & Fractals* **6**, 347-356 (1995). [Download](#)
6. C. Masoller, C. Cabeza, and A. C. Sicardi, "Effect of the nonlinear gain in the visibility of a semiconductor laser with incoherent feedback in the coherence collapsed regime", *IEEE J. Quantum Electron.* **31**, 1022-1028 (1995). [Download](#)
7. C. Masoller, "Effect of the external cavity length in the dynamics of a semiconductor laser with optical feedback", *Opt. Commun.* **128**, 363-376 (1996). [Download](#)
8. A. Figliola and C. Masoller, "Feedback-induced destabilization of a laser diode using wavelets", *Phys. Rev. A* **56**, 1492-1496 (1997). [Download](#)
9. C. Masoller, "Implications of how the linewidth enhancement factor is introduced on the Lang and Kobayashi model", *IEEE J. Quantum Electron.* **33**, 796-803 (1997). [Download](#)
10. C. Masoller, "Comparison of the effects of nonlinear gain and weak optical feedback on the dynamics of semiconductor lasers", *IEEE J. Quantum Electron.* **33**, 804-814 (1997). [Download](#)
11. C. Masoller, "Spatio-temporal dynamics in the coherence collapsed regime of semiconductor lasers with optical feedback", *Chaos* **7**, 455-462 (1997). [Download](#)
12. C. Masoller and N. B. Abraham, "Stability and dynamical properties of the coexisting attractors of an external cavity semiconductor laser", *Phys. Rev. A* **57**, 1313-1322 (1998). [Download](#)
13. C. Masoller and N. B. Abraham, "Stability and modulation properties of a semiconductor laser with weak optical feedback from a distant reflector", *Quantum Semiclass. Opt.* **10**, 519-534 (1998). [Download](#)
14. C. Masoller, A. Figliola, M. Giudici, J. R. Tredicce and N. B. Abraham, "Wavelet analysis of low frequency fluctuations of a semiconductor laser", *Opt. Commun.* **157**, 115-120 (1998). [Download](#)
15. C. Masoller and N. B. Abraham, "Polarization dynamics in VCSELs with optical feedback through a quarter-wave plate", *Appl. Phys. Lett.* **74**, 1078-1080 (1999). [Download](#)
16. C. Masoller, N. B. Abraham, "Low frequency fluctuations in vertical-cavity surface-emitting semiconductor lasers with moderate optical feedback", *Phys. Rev. A* **59**, 3021-3031 (1999). [Download](#)
17. S. Varela, C. Masoller, and A. C. Sicardi, "Numerical simulations of the effect of noise on a delayed pitchfork bifurcation", *Physica A* **283**, 228-232 (2000). [Download](#)
18. M. S. Torre, C. Masoller, N. B. Abraham, and H. F. Ranea Sandoval, "Carrier dynamics in semiconductor lasers operating in the low-frequency fluctuations regime". *Quantum Semiclass. Opt.* **2**, 563 (2000). [Download](#)
19. C. Masoller, "Anticipation in the synchronization of chaotic semiconductor lasers with optical feedback", *Phys. Rev. Lett.* **86**, 2782-2785 (2001). [Download](#)
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21. C. Masoller, H. L. D. de Souza Cavalcante, and J. R. Rios Leite, "Delayed coupling of logistic maps", *Phys. Rev. E.* **64**, 037202-1-4 (2001). [Download](#)
22. M. S. Torre and C. Masoller, "Turn-on transient dynamics of a semiconductor laser with optical feedback", *Int. J. Numerical Modelling (special issue: Laser Device Modeling)* **14**, 359-365 (2001).
23. C. Masoller and D. Zanette, "Anticipated synchronization in coupled chaotic maps with delays", *Physica A* **300**, 359-366 (2001). [Download](#)
24. A. Locquet, C. Masoller, P. Mégret, and M. Blondel, "Comparison of two types of synchronization of external-cavity semiconductor lasers", *Opt. Lett.* **27**, 31-33 (2002). [Download](#)

25. C. Masoller, "Noise-induced resonance in delayed feedback systems", Phys. Rev. Lett. **88**, 034102 1-4 (2002). [Download](#)
26. M. S. Torre and C. Masoller, "Effects of carrier transport on the transverse-mode selection of index-guided vertical-cavity surface-emitting lasers", Opt. Commun. **202**, 311-318 (2002). [Download](#)
27. E. Hernández-García, C. Masoller, and C. R. Mirasso, "Anticipating the dynamics of chaotic maps", Phys. Lett. A **295**, 39-43 (2002). [Download](#)
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30. J. Mulet, C. Masoller and C. R. Mirasso, "Modeling bidirectionally coupled single-mode semiconductor lasers", Phys. Rev. A. **65** 063815 1-12 (2002). [Download](#)
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33. M. Sciamanna, C. Masoller, N.B. Abraham, F. Rogister, P. Mégret and M. Blondel "Different regimes of low-frequency fluctuations in vertical-cavity surface-emitting lasers", J. Opt. Soc. Am. B **20**, 37-44 (2003). [Download](#)
34. C. Masoller, "Distribution of residence times of bistable systems with time-delayed feedback driven by noise", Phys. Rev. Lett. **90**, 020601 (2003). [Download](#)
35. A. C. Marti and C. Masoller, "Delay-induced synchronization phenomena in an array of globally coupled logistic maps", Phys. Rev. E **67**, 056219 1-6 (2003). [Download](#)
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38. M. Ciszak, O. Calvo, C. Masoller, C. R. Mirasso, and R. Toral, "Anticipating the response of excitable systems driven by random forcing", Phys. Rev. Lett. **90**, 204102 1-4 (2003). [Download](#)
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45. M. S. Torre, C. Masoller, P. Mandel and K. A. Shore, "Transverse-mode dynamics in directly modulated vertical-cavity surface-emitting lasers with optical feedback", *IEEE J. Quantum Electron.* **40**, 620-627 (2004). [Download](#)
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65. C. Masoller, C. Serrat and R. Vilaseca, "Modeling multi-longitudinal-mode semiconductor lasers with incoherent feedback", *Phys. Rev. A.* **76**, 043814 1-8 (2007). [Download](#)
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67. A. C. Martí, M. Ponce, C. Masoller, "Dynamics of delayed-coupled chaotic logistic maps: Influence of network topology, connectivity and delay times", *Pramana – journal of physics* **70**, 1-6 (2008). [Download](#)
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69. C. Masoller, M. C. Torrent, J. Garcia-Ojalvo, "Interplay of subthreshold activity, time-delayed feedback and noise on neuronal firing patterns", *Phys. Rev. E.* **78**, 041907 1-8 (2008). [Download](#)
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74. O. A. Rosso, C. Masoller, "Detecting and quantifying stochastic and coherence resonances via information-theory complexity measurements", *Phys. Rev. E* **79**, 040106(R) (2009). [Download](#)
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76. O. Descalzi, A. C. Martí, C. Masoller, O. A. Rosso, "Topics on non-equilibrium statistical mechanics and nonlinear physics", *Phil. Trans. R. Soc. A* **367**, 3151-3156 (2009). [Download](#)
77. C. Masoller, M. C. Torrent, J. Garcia-Ojalvo, "Dynamics of globally delay-coupled neurons displaying subthreshold oscillations", *Phil. Trans. R. Soc. A* **367**, 3255-3266 (2009). [Download](#)
78. C. Masoller, M. Oria, and R. Vilaseca, "Modeling a semiconductor laser with an intracavity atomic absorber", *Phys. Rev. A* **80**, 013830 (2009). [Download](#)
79. J. Zamora-Munt, C. Masoller and J. Garcia-Ojalvo, "Transient low-frequency fluctuations in semiconductor lasers with optical feedback", *Phys. Rev. A* **81**, 033820 (2010). [Download](#)
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81. C. Masoller and I. Brener, "Introduction to the Topical Issue on Laser Dynamics and Nonlinear Photonics", *Eur. Phys. J. D* **58**, 153-159 (2010). [Download](#)
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87. J. Zamora-Munt, C. Masoller, J. García-Ojalvo and R. Roy, “Crowd synchrony and quorum sensing in delay-coupled lasers”, *Phys. Rev. Lett.* **105**, 264101 (2010). [Download](#)
88. C. Masoller and O. A. Rosso, “Quantifying the complexity of the delayed logistic map”, *Phil. Trans. R. Soc. A* **369**, 425-438 (2011). [Download](#)
89. M. Barreiro, A. C. Martí and C. Masoller, “Inferring long memory processes in the climate network via ordinal pattern analysis”, *Chaos* **21**, 013101 (2011). [Download](#)
90. C. Masoller and F.M. Atay, “Complex transitions to synchronization in delay-coupled networks of logistic maps”, *Eur. Phys. J. D* **62**, 119–126 (2011). [Download](#)
91. C. Bonatto, M. Feyereisen, S. Barland, M. Giudici, C. Masoller, J. R. Rios Leite, and J. R. Tredicce, “Deterministic optical rogue waves”, *Phys. Rev. Lett.* **107**, 053901 (2011). Featured in Research Highlights of *Nature Photonics* (Vol. 5, No. 10, Page 571 DOI:10.1038/nphoton.2011.240). [Download](#)
92. N. Rubido, J. Tiana-Alsina, M. C. Torrent, J. Garcia-Ojalvo, and C. Masoller, “Language organization and temporal correlations in the spiking activity of an excitable laser: Experiments and model comparison”, *Phys. Rev. E* **84**, 026202 (2011). [Download](#)
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94. M. S. Torre, A. Gavrielides, and C. Masoller, “Numerical characterization of transient polarization square-wave switching in two orthogonally coupled VCSELs”, *Opt. Express.* **19**, 20269 (2011). [Download](#)
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96. D. W. Sukow, T. Gilfillan, B. Pope, M. S. Torre, A. Gavrielides, and C. Masoller, “Square-wave switching in vertical-cavity surface-emitting lasers with polarization-rotated optical feedback: experiments and simulations”, *Phys. Rev. A* **86**, 033818 (2012). [Download](#)
97. S. Perrone, R. Vilaseca, and C. Masoller, “Stochastic logic gate that exploits noise and polarization bistability in an optically injected VCSEL”, *Opt. Express* **20**, 22692 (2012). [Download](#)
98. J. Zamora-Munt, B. Garbin, S. Barland, M. Giudici, J. R. Rios Leite, C. Masoller, and J. R. Tredicce, “Rogue waves in optically injected lasers: origin, predictability, and suppression”, *Phys. Rev. A* **87**, 035802 (2013). [Download](#)
99. A. Aragonese, N. Rubido, J. Tiana-Alsina, M. C. Torrent, and C. Masoller, “Distinguishing signatures of determinism and stochasticity in spiking complex systems”, *Sci. Rep.* **3**, 1778; DOI:10.1038/srep01778 (2013). [Download](#)
100. J. I. Deza, M. Barreiro and C. Masoller, “Inferring interdependencies in climate networks constructed at inter-annual, intra-season and longer time scales”, *Eur. Phys. J. Special Topics* **222**, 511–523 (2013). [Download](#)
101. G. De Polsi, C. Cabeza, A. C. Martí, and C. Masoller, “Characterizing the dynamics of coupled pendulums via symbolic time series analysis”, *Eur. Phys. J. Special Topics* **222**, 501–510 (2013). [Download](#)

102. J. A. Reinoso, J. Zamora-Munt, C. Masoller, “*Extreme intensity pulses in a semiconductor laser with a short external cavity*”, Phys. Rev. E **87**, 062913 (2013). [Download](#)
103. G. Tirabassi and C. Masoller, “*On the effects of lag-times in networks constructed from similarities of monthly fluctuations of climate fields*”, EPL **102**, 59003 (2013). [Download](#)
104. C. Masoller, M. Sciamanna, and A. Gavrielides, “*Two-parameter study of square-wave switching dynamics in orthogonally delay-coupled semiconductor lasers*”, Phil. Trans. R. Soc. A **371**, 20120471 (2013). [Download](#)
105. M. Salvide, C. Masoller and M. S. Torre, “*All-optical stochastic logic gate based on a VCSEL with tunable optical injection*”, to appear in IEEE J. Quantum Electron (2013). [Download](#)
106. S. D. Cohen, A. Aragoneses, D. Rontani, M. C. Torrent, C. Masoller and D. J. Gauthier, “*Multidimensional subwavelength position sensing using a semiconductor laser with optical feedback*”, submitted (2013). [Download](#)
107. A. Aragoneses, S. Perrone, T. Sorrentino, M. C. Torrent and C. Masoller, “*Unveiling the complex organization of recurrent patterns in dynamical excitable systems*”, submitted (2013). [Download](#)

Book Chapters

S. Sivaprakasam, C. Masoller, “*Chaos synchronization*”, Chapter 6, pp 185-216, of “Unlocking dynamical diversity: optical feedback effects on semiconductor lasers”. Editors: Deborah Kane and Alan Shore. Wiley and Sons, March 2005. ISBN: 0-470-85619-X.

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