



**Dr. Gabriela Barreto Lemos**

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## EDUCATION AND EMPLOYMENT

- 2019 – **Visiting Lecturer.** University of Massachusetts, Boston, USA.
- 2017-2019 **Postdoctoral Researcher.** International Institute of Physics, Natal, Brazil.
- 2016 **Scientist in Residence.** School of the Art Institute of Chicago, USA.
- 2012-2016 **Senior Scientist.** Institute for Quantum Optics and Quantum Information, Austria.
- 2010-2012 **Postdoctoral Researcher.** Institute of Physics, Federal University of Rio de Janeiro, Brazil.
- 2006-2010 **PhD in Physics.** Institute of Physics, Federal University of Rio de Janeiro, Brazil .  
Thesis title: *Decoherence and Entanglement Decay Produced by Chaotic Environments with Few Degrees of Freedom.* Advisor: Fabricio Toscano.
- 2009-2010 **PhD student** at the Center for Nonlinear and Complex Systems, University of Insubria, Italy.  
Advisor: Giuliano Benenti.
- 2004-2006 **M.Sc. in Physics.** Department of Physics, Federal University of Minas Gerais, Brazil (DF-UFMG).  
Dissertation title: *A Schematic and a Realistic Model of Coherent Tunneling in a Double Well.*  
Advisor: Maria Carolina Nemes.
- 2000-2004 **Bachelor in Physics.** Department of Physics, Federal University of Minas Gerais, Brazil (DF-UFMG).
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## AWARDS & DISTINCTIONS

### General

- 2019 Platinum Medal Mietta Santiago, National Congress, Brazil.  
(Awarded for research “Quantum Imaging with Undetected Photons”).
- 2018 Guerilla Science and National Science Foundation [sci-art residency](#) for the project “The Fabric of Space-Time” with Kayla Lewis (see Art-Science collaborations).
- 2004 Best Undergraduate research in the hard sciences at the Federal University of Minas Gerais. Project: “A schematic model of an open double well system.”

### Patents

For novel quantum imaging techniques:  
United States Patent No. US9,557,262  
European Patent No. EP 2 887 137 B1

### Academic fellowships

- 2017 Post-doctoral fellowship. International Institute of Physics, Brazil.
- 2016 Scientist in Residence, School of the Art Institute of Chicago, USA.
- 2012 **Vienna Center for Quantum Science and Technology (VCQ) postdoctoral Fellowship, Institute for Quantum Optics and Quantum Information, Austrian Academy of Sciences (ÖAW), Austria.**

- 2011 Post-Doctoral Fellowship, Brazilian Federal Agency for the Support and Evaluation of Graduate Education (CAPES) and Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ), Brazil.
  - 2010 Junior Post-Doctoral Fellowship, National Council for Scientific and Technological Development (CNPq), Brazil.
  - 2009 International PhD Scholarship, CNPq, Brazil.
  - 2006 PhD Scholarship, CAPES, Brazil.
  - 2004 MSc Scholarship, CAPES, Brazil.
  - 2002 Undergraduate research Scholarship, CNPq, Brazil.
  - 2000 Special Training Program Scholarship, CAPES, Brazil.
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## RESEARCH & PUBLICATIONS

Research highlights indicated in bold.

- 2019 Lahiri, M.; Hochrainer, A.; Lapkiewicz, R.; Barreto Lemos, G.; Zeilinger, A. "Induced coherence without induced emission: Analysis of quantumness".
- 2019 Polino, E.; Agresti, I.; Poderini, D.; Carvacho, G.; Milani, G.; Barreto Lemos, G.; Chaves R.; Sciarrino, F.; "Device independent certification of a quantum delayed choice experiment", Phys. Rev. A 100, 02211.
- 2019 J Fuenzalida, A Hochrainer, GB Lemos, M Lahiri, A Zeilinger, "Resolution in Quantum Imaging with Undetected Photons", Frontiers in Optics, JW3A. 103
- 2018 Cardoso, A.C.; Berruezo, L.P.; Ávila D.F.; Lemos, G.B.; Pimenta, W.M.; Monken, C.H.; Saldanha, P.L.; Pádua, S.P. *Classical Imaging with Undetected Light*. Phys. Rev. A 97, 033827.
- 2018** Chaves, R.; Barreto Lemos, G.; Pienaar, J. *Causal modelling the delayed choice experiment*. Phys. Rev. Lett. 120, 190401.  
**Featured in Quanta Magazine and Wired. Selected as a Research Highlight by the Brazilian Society of Physics.**
- 2017 Lahiri, M.; Hochrainer, A.; Lapkiewicz, R.; Barreto Lemos, G.; Zeilinger, A. *Twin-photon correlations in single photon interference*. Physical Review A 96, 013822.
- 2017 Hochrainer, A.; Lahiri, M.; Lapkiewicz, R.; Barreto Lemos, G.; Zeilinger, A. *Quantifying momentum correlations between two light beams by detecting only one*. Proceedings of the National Academy of Sciences (PNAS), 114, 1508, 2017.
- 2017 Hochrainer, A.; Lahiri, M.; Lapkiewicz, R.; Barreto Lemos, G.; Zeilinger, A. *Interference fringes controlled by non-interfering photons*. Optica, 4, 341.
- 2017 Lahiri, M.; Hochrainer, A.; Lapkiewicz, R.; Barreto Lemos, G.; Zeilinger, A. *Partial polarization by quantum distinguishability*. Physical Review A, 95, 033816.
- 2015** Lahiri, M.; Lapkiewicz, R.; Barreto Lemos, G.; Zeilinger, A. *Theory of quantum imaging with undetected photons*. Physical Review A 92, 013832.
- 2014** Barreto Lemos, G.; Borish, V.; Cole, G.; Ramelow, S.; Lapkiewicz, R. and Zeilinger, A. *Quantum imaging with undetected photons*. Nature , v. 512, p. 409, 2014.  
**Discover magazine's #10 top story of 2014.**

- 2014 Hor-Meyll, M.; De Almeida, J. O.; [Barreto Lemos, G.](#); Souto Ribeiro, P.H. and Walborn S.P. *Ancilla-assisted measurement of photonic spatial correlations and entanglement*. Physical Review Letters (Print), v. 112, p. 053602.
- 2014 [Barreto Lemos, G.](#); Souto Ribeiro, P.H. and Walborn, S.P. *Optical integration of a real-valued function by measurement of a Stokes parameter*. Journal of the Optical Society of America A, Optics, Image Science, and Vision, v. 31, p. 704.
- 2014 [Barreto Lemos, G.](#); De Almeida, J. O.; Walborn, S. P.; Souto Ribeiro P. H. and Hor-Meyll, M. *Characterization of a spatial light modulator as a polarization quantum channel*. Physical Review A, v. 89, p. 042119.
- 2012** [Barreto Lemos, G.](#); Gomes, R. M.; Walborn, S.P.; Souto Ribeiro, P.H.; Toscano, Fabricio . *Experimental observation of quantum chaos in a beam of light*. Nature Communications, v. 3, p. 1211, 2012. [Research highlight in Nature Photonics](#).
- 2011 [Barreto Lemos, G.](#); Toscano, F. *Decoherence, entanglement decay, and equilibration produced by chaotic environments*. Physical Review E, v. 84, p. 016220.
- 2010 [Barreto Lemos, G.](#); Benenti, Giuliano. *Role of chaos in quantum communication through a dynamical dephasing channel*. Physical Review A, v. 81, p. 062331.
- 2007** Salgueiro, A. N.; de Toledo Piza, A.F.R.; [Barreto Lemos, G.](#); Drummond, R.; Nemes, M. C.; Weidemüller, M. *Quantum dynamics of bosons in a double-well potential: Josephson oscillations, self-trapping and ultralong tunneling times*. European Physical Journal D, v. 44, p. 537-540.
- 2005 [Barreto Lemos, G.](#); Santos, M.F.; Peixoto de Faria, J.G.; Terra Cunha, M.O. and Nemes, M.C. *Decoherence and localization in the double well model*. ArXiv:quant-ph/0504020).
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## TEACHING

### Courses designed and taught

- 2020 Nostalgia for the light. Undergraduate semester course (level 200). Delivery: Face to face. University of Massachusetts Boston, USA.
- 2020 Light in Art and the Cosmos. Undergraduate semester course (level 100). Delivery: online. University of Massachusetts Boston, USA.
- 2019 Investigating the foundations of quantum physics by means of experiments with entangled photons. Undergraduate mini-course (8 hours). University of São Paulo (USP-São Carlos), Brazil.
- 2018 Introduction to Experiments with Entangled Photons (8 hours). Graduate and undergraduate mini-course. Cuantos 2018, Argentina.
- 2016 Quantum Reality. 2 sections. Undergraduate semester course. School of the Art Institute of Chicago, USA.

### Courses taught

- 2019 Introductory Calculus-based College Physics 2. Undergraduate semester course. University of Massachusetts Boston, USA.
- 2012 Introductory calculus-based Physics 1. Undergraduate semester course. Institute of Physics, Federal University of Rio de Janeiro, Brazil
- 2011 Physics 1. Undergraduate semester course. Institute of Physics, Federal University of Rio de Janeiro, Brazil
- 2011 Experimental Physics 1. Undergraduate semester course. Institute of Physics, Federal University of Rio de Janeiro Brazil
- 2008 Experimental Physics 1. Two sections. Undergraduate semester course. Institute of Physics, Federal University of Rio de Janeiro, Brazil
- 2005 Physics. High school level course (one school year). Cursinho Caminhar, a social project in Belo Horizonte, Brazil.

## SCIENCE COMMUNICATION

### Service Projects

- 2018 *Little Seeds of Science*, Co-creator and Co-Coordinator. Workshops held at public schools, aimed especially at attracting to Science 6-8 year old girls from low income areas in the Northeast of Brazil. In collaboration with Prof. Laura Teresa Corredor Bohórquez (DFET-UFRN).

### Publications

- 2019 Schaffer, K; Barreto Lemos, G. *Obliterating Thinginess: An introduction to the “what” and “so what” of Quantum Mechanics*. Foundations of Science, 1 (2019).
- 2020 Forward of E-Book “Mulher faz ciencia, volume 2” (Women make Science, Volume 2). Published by Portal UOL and Fundação de Amparo à Pesquisa do Estado de Minas Gerais.

### Public Lectures (selected)

- 2019 What is quantum entanglement? University of São Paulo (USP-São Carlos), Brazil.
- 2018 *Wave-particle duality*. Cientec, UFRN, Brazil.
- 2017 *Quantum interference and induced coherence*. XII Physics Week at the University of Brasilia, Brazil.
- 2017 [Invited talk \*Indistinguishability and Interference\*](#), The National Observatory, Rio de Janeiro, Brazil.
- 2017 *The end of the Narrative in Physics*, The Lacanian School of Psychoanalysis, Rio de Janeiro, Brazil.
- 2016 [Through the Quantum Looking Glass](#). Part of series *Conversations in Art and Science*, School of the Art Institute of Chicago, USA.
- 2016 Panel member on *Quantum Technologies* and invited presentation at the workshop of Prof. Dr. David Wineland. The 66th Lindau Nobel Laureate Meeting, Lindau, Germany.
- 2015 [What if we were the size of an atom?](#) TedX Vienna, Austria.

## Art-Science collaborations

- 2018 *The Fabric of Space-Time* ([video](#), [website](#)). Project in collaboration with artist Kayla Lewis. It was awarded an NSF Grant and presented at *Figment Festival 2018*, in New York City, USA and at the *World Makers Faire* at the New York Hall of Science in September, 2018.
- 2018 [Keynote Speaker](#) and invited panelist at the [Quantum Unlearning Symposium](#) at the School of the Art Institute of Chicago, USA.
- 2017 *Yes or no?* Multimedia project with Kayla Lewis.
- 2017 *Strange Immanence*. Scientific consultation for the film by Prof. Carlos Segundo, Brazil.
- 2016 [Installation \*Decoherence 1.0\* in collaboration with \*Irradiation Reloaded\* and Dr. Mehul Malik](#). Project Trezor, Vienna, Austria.
- 2015 [2nd exhibit of Brazilian scientific art, ArtBio. Museum of Contemporary Art. Rio de Janeiro, Brazil.](#)
- 2015 [Talk-performance \*Wave-particle duality\*, with VJ1mpar, Devagar, Belo Horizonte, Brazil.](#)
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## ACADEMIC INVITED TALKS AT CONFERENCES (SELECTED)

- 2019 Quantum Imaging with Undetected Photons and its Classical Analog, Sensing with Quantum Light, Germany.
- 2018 *Measuring entanglement without coincidence detection*, Modern Topics in Quantum Information, International Institute of Physics, Brazil.
- 2018 *Using art and recreation to attract young people and children to Physics*. Challenges for Education in Physics in High School, International Institute of Physics, Brazil.
- 2017 Indistinguishability and interference. VI Quantum Information Workshop, Paraty, Brazil.
- 2016 *Twin photon correlations in single-photon interference*. PICQUE - Bristol Young Scientists Conference on Quantum Information with Photons, Bristol, UK.
- 2015 *Quantum imaging with undetected photons*. The 45th Winter Colloquium on Physics of Quantum Electronics, Snowbird, USA.
- 2014 *Quantum imaging with undetected photons*. III Bienal Latinoamericana de Óptica Cuántica, La Plata, Argentina.
- 2014 *Quantum imaging with undetected photons*, International Iran Conference on Quantum Information 2014, Isfahan, Iran.