

Cristhiano Duarte, Ph.D.

Post-Doctoral Fellow, Schmid College of Science and Technology

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🌐 <https://www.chapman.edu/scst/index.aspx>



Personal Information

I am a very collaborative mathematician currently working as a post-doctoral fellow at the Schmid College for Science and Technology – USA. In addition to that, I am also an active member of two quantum-information-oriented groups, namely: EnLight and Quantum Information and Quantum Matter Group. Due my interdisciplinary approach to science my broad background allows me to connect different areas, such as: **(Quantum) Information Theory, Graph Theory, Probability, Foundations of Physics, (Linear) Algebra, and Convex Optimization**. I also have previous proved experience in teaching at undergraduate level as well as some experience in tutoring and mentoring students both at undergraduate and graduate levels.



Education

- 2013 – 2016 ■ **Ph.D. Mathematics, Federal University of Minas Gerais, Brazil.**
Thesis title: *The parts and the whole: how the concept of tensor product affects quantum theory.*
Advisors: Raphael Campos Drumond and Marcelo Terra Cunha
- 2011 – 2013 ■ **M.Sc. Mathematics, Federal University of Juiz de Fora, Brazil.**
Dissertation title: *On Catalysis in Quantum Systems.*
Advisor: Marcelo de Oliveira Terra Cunha
- 2006 – 2011 ■ **B.Sc. Physics, Federal University of Juiz de Fora, Brazil.**
Final Project title: *Can all entangled states be useful?*
Advisor: Marcelo de Oliveira Terra Cunha

Academic Positions



- 2018 – ... ■ **Postdoctoral Fellow - Chapman University - Schmid College for Science and Technology (USA).**
Supervisor: Matthew Leifer and Gregory Goldsmith
Project: Grand Challenges Initiative
- 2017 – 2018 ■ **Postdoctoral Fellow - International Institute of Physics (Brazil).**
Supervisor: Rafael Chaves
Project: Resource Theory and its Applications on Quantum Information and Foundations of Quantum Mechanics
- 2017 ■ **Postdoctoral Fellow - Brazilian Institute for Pure and Applied Mathematics (Brazil).**
Supervisor: Roberto Oliveira
Project: Necessary Conditions for Extended Noncontextuality in General Sets of Random Variables
- 2016 – 2017 ■ **Postdoctoral Fellow - Federal University of Minas Gerais (Brazil).**
Supervisor: Raphael Campos Drumond
Project: Graphs, Geometry and Algebra: other perspectives to study quantum mechanics and resource theories

Employment History



- 2013  **Temporary Teacher - Federal University of Minas Gerais.**
Teaching at undergraduate level: Disciplines: Analytic Geometry and Linear Algebra
- 2014  **Voluntary Teacher - Federal University of Minas Gerais.**
Teaching at undergraduate level: Discipline: How to construct the real numbers.
Special course: planned to those students that had been awarded with medals at our national math Olympiad.

Research Publications

Journal Articles

- 1 Rai, A., **Duarte, C.**, Brito, S., & Chaves, R. (2019). Geometry of the quantum set on no-signaling faces. *Phys. Rev. A*, 99, 032106. doi:10.1103/PhysRevA.99.032106
- 2 Amaral, B., **Duarte, C.**, & Oliveira, R. I. (2018). Necessary conditions for extended noncontextuality in general sets of random variables. *Journal of Mathematical Physics*, 59(7), 072202. doi:10.1063/1.5024885. eprint: <https://doi.org/10.1063/1.5024885>
- 3 **Duarte, C.** & Amaral, B. (2018). Resource theory of contextuality for arbitrary prepare-and-measure experiments. *Journal of Mathematical Physics*, 59(6), 062202. doi:10.1063/1.5018582. eprint: <https://doi.org/10.1063/1.5018582>
- 4 **Duarte, C.**, Brito, S., Amaral, B., & Chaves, R. (2018). Concentration phenomena in the geometry of bell correlations. *Phys. Rev. A*, 98, 062114. doi:10.1103/PhysRevA.98.062114
- 5 **Duarte, C.**, Drumond, R. C., & Oliveira, R. I. (2018). Small violations of bell inequalities for multipartite pure random states. *Journal of Mathematical Physics*, 59(5), 052202. doi:10.1063/1.5026690. eprint: <https://doi.org/10.1063/1.5026690>
- 6 **Duarte, C.**, Carvalho, G. D., Bernardes, N. K., & de Melo, F. (2017). Emerging dynamics arising from coarse-grained quantum systems. *Phys. Rev. A*, 96, 032113. doi:10.1103/PhysRevA.96.032113
- 7 Drumond, R. C., **Duarte, C.**, Terra Cunha, M., & Nemes, M. C. (2016). Universality of finite-time disentanglement. *Phys. Rev. A*, 93, 022313. doi:10.1103/PhysRevA.93.022313
- 8 **Duarte, C.**, Drumond, R. C., & Cunha, M. T. (2016). Self-catalytic conversion of pure quantum states. *Journal of Physics A: Mathematical and Theoretical*, 49(14), 145303.  <http://stacks.iop.org/1751-8121/49/i=14/a=145303>
- 9 Bragança, H., Mascarenhas, E., Luiz, G. I., **Duarte, C.**, Pereira, R. G., Santos, M. F., & Aguiar, M. C. O. (2014). Nonuniversality of entanglement convertibility. *Phys. Rev. B*, 89, 235132. doi:10.1103/PhysRevB.89.235132
- 10 Rabelo, R., **Duarte, C.**, López-Tarrida, A. J., Cunha, M. T., & Cabello, A. (2014). Multigraph approach to quantum non-locality. *Journal of Physics A: Mathematical and Theoretical*, 47(42), 424021.  <http://stacks.iop.org/1751-8121/47/i=42/a=424021>

Skills

- Languages  *English:* Fluent (reading and writing). Intermediate (speaking)
Portuguese: Native Speaker
Spanish: Beginner (reading and speaking). Beginner (writing).
TeX: Fluent
- Coding  Matlab and C.

Miscellaneous Experience

Awards and Achievements

- 2018 **Travel Grant**, Open Arms Brazil-Travel Grant – Grant awarded for participation in the International Congress of Mathematicians 2018 (declined for political reasons).
- 2017 **Summer PostDoctoral Fellowship**, Institute for Pure and Applied Mathematics (IMPA) – Term spent as Researcher under the supervision of Dr. Roberto Imbuzeiro at IMPA.

Academic Visits and Collaborations (partially or fully funded)

- 2018 **Short Visit**, Institute for Pure and Applied Mathematics (IMPA) – Collaboration with Roberto Imbuzeiro.
- Short Visit**, Brazilian Center for Research in Physics (CBPF) – Collaboration with Fernando de Melo.
- 2017 **Visiting Specialist**, Brazilian Center for Research in Physics (CBPF) – Term spent as Visiting Specialist in the Quantum Information Group at CBPF.
- Short Visit**, Max-Planck Institute for Mathematics in the Sciences (MIS) – Collaboration with Tobias Fritz - Special Seminar: Sudden Death of Entanglement
- 2016 **Visiting Specialist**, Brazilian Center for Research in Physics (CBPF) – Term spent as Visiting Specialist in the Quantum Information Group at CBPF.

Referee Works

- 2017 **Journal of Physics A: Mathematical and Theoretical**

Events

Talks, Poster Presentations and Participations

- 2019 **APS March Meeting** - Boston - USA. **Title (talk):** *Small Violations of Bell-Inequalities*. 2018. (Conference)
- Wigner's Friends** in Boston - Boston - USA. 2019. (Workshop)
- 2018 **Q-Turn** changing paradigms in quantum science - Florianopolis. **Title (talk):** *Small Violations Bell Inequalities*. 2018. (Workshop)
- X Summer Workshop** of Mathematics at Federal University of Juiz de Fora. **Title (talk):** *Small Violations of General Bell Inequalities*. 2018. (Workshop)
- 2017 **Workshop** on Quantum Correlations, Contextuality and All That... Again and Again Natal. 2017. (Workshop)
- VI Quantum Information School and Workshop** - Paraty. **Title (poster):** *On the complete understanding of self-catalysis*. 2015. (School and Workshop)

Events (continued)

- Quantumness: A celebration of Luiz Davidovich's research career on his 70th birthday. 2017. (Special Meeting).
- 2016 ■ VI Workshop de Informação e Óptica Quântica. **Title (talk):** *Emergent Coarse-Grained Dynamics*. 2016. (Meeting).
- 2015 ■ 30o Colóquio Brasileiro de Matemática. **Title (talk):** *Coloured-Graph Approach to Quantum Non-Locality*. 2015. (Congress).
- Quantum Information at Benasque. **Title (presentation):** *Coloured Graphs Approach to Quantum Non-Locality*. 2015. (Meeting).
- V Quantum Information School and Workshop. **Title (poster):** *Colored Graph Approach to Quantum Non-Locality*. 2015. (School and Workshop)
- Workshop on Quantum Correlations, Contextuality and All That... Again. 2015. (Workshop).
- 2013 ■ IV Quantum Information School and Workshop - Paraty. **Title (poster):** *Catalysis in Quantum Systems*. 2013. (School and Workshop)
- 2012 ■ I Workshop da Pós-Graduação em Física at Federal University of Juiz de Fora. **Title (talk):** *Catalysis in Quantum Systems*. 2012. (Workshop).
- 2011 ■ Jornadas em Geometria Algébrica-JOGA. 2011. (Congress).
- 2010 ■ V Simpósio Nacional/ Jornadas de Iniciação Científica. **Title (poster):** *Entanglement: an introduction*. 2010. (National Meeting).
- WECIQ-2010: Workshop and School of Quantum Information. Petrópolis-Brazil. 2010. (Workshop).
- 2009 ■ XXX Encontro Nacional de Física de Partículas e Campos. **Title (poster):** *String-Localized Quantum fields*. 2009. (Meeting).
- 2008 ■ Workshop Quantum Vacuum-Quantum vacuum properties in laboratories and in the Universe. 2008. (Congress).

Events I organized

- 2016 ■ VI Workshop de Informação e Óptica Quântica (VI Workshop of Quantum Information and Quantum Optics). 2016. (Meeting)