Marco Túlio Quintino

Curriculum Vitae

Associate Professor
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Last update: February 16, 2025

Research Interests

Quantum information and quantum computation, quantum correlations, causality in quantum theory, higher-order quantum operations, Bell nonlocality, EPR steering, entanglement, measurement incompatibility, quantum discrimination tasks, and Semidefinite Programming.

Employment

Sep 2022 – now **Associate Professor (Maître de Conf.)**, *Sorbonne Université*, Paris, France
Member of the Quantum Information team at LIP6

Mar 2021 – Aug 2022 **Postdoctoral researcher**, *IQOQI Vienna*, Vienna, Austria
Postdoctoral Researcher at the group of Prof. Časlav Brukner
Funding: ESQ postdoc fellowship

Jun 2020 – Mar 2021 **Postdoctoral researcher**, *University of Vienna*, Vienna, Austria
Postdoctoral Researcher at the group of Prof. Časlav Brukner
Funding: Austrian Science Fund (FWF) through the SFB project BeyondC

Mar 2019 – May 2020 **Postdoctoral researcher**, *The University of Tokyo*, Tokyo, Japan
Postdoctoral Researcher at the group of Prof. Mio Murao
Funding: Q-LEAP project of the MEXT Japan

Nov 2016 – Nov 2018 **Postdoctoral researcher**, *The University of Tokyo*, Tokyo, Japan
Postdoctoral Researcher at the group of Prof. Mio Murao
Funding: JSPS postdoc fellowship

Education

Jan 2025 **Habilitation in Computer Science [HDR]**, *Sorbonne University*, Paris, France
Thesis: Quantum information processing via higher-order operations
Defence date: 17 Jan 2025
Jury: Pablo Arrighi, Anne Broadbent, Giulio Chiribella, Elham Kashefi, Mário Ziman

Oct 2012 – Sep 2016 **PhD in Physics**, *Université de Genève*, Geneva, Switzerland
Thesis: Quantum entanglement and measurement incompatibility as resources for nonlocality
Defence date: 09 Sep 2016
Supervisor: Nicolas Brunner
Funding: SNF, Switzerland

Aug 2010 – Sep 2012 **MSc in Physics**, *UFMG*, Belo Horizonte, Brazil
Thesis: Black box correlations: locality, noncontextuality, and convex polytopes
Defence date: 12 Sep 2012
Supervisor: Marcelo Terra Cunha
co-supervisor: Daniel Cavalcanti
Funding: CAPES, Brazil

Feb 2007– Aug 2010 **BSc in Physics**, *UFMG*, Belo Horizonte, Brazil
Monograph: Não-localidade como recurso para comunicação
Supervisor: Marcelo Terra Cunha
Funding: CNPq, Brazil

Grants and awards

2024 **Research grant**, Tremplins nouveaux entrants & nouvelles entrantes, France
2023 **Funding for PhD student**, QuantEdu France (via PCQT), France
2020 **Postdoc research fellowship**, *ESQ Postdoc Fellowship Program*, Austria/EU
2016 **Grant-In-Aid for Scientific Research**, *KAKENHI*, Japan
2016 **Postdoc research fellowship**, *JSPS Postdoc Fellowship*, Japan
2012 **Master's's research stipend**, *CAPES Master's's Stipend*, Brazil

Languages

Portuguese (native), English (fluent), French (fluent), Spanish (advanced), Japanese (intermediate)
Matlab (fluent), Mathematica (fluent), Julia (elementary), Python (elementary), Bash (elementary)
I use GitHub (https://github.com/mtcq) to share relevant computational code I develop.

Publications

Summary: 45 peer-reviewed journal publications, which include 12 Phys. Rev. Lett., 2 Nat Commun, 1 J. Math. Phys., 1 IEEE Trans. Inf. Theory, and 11 Quantum.

- More than 90 different co-authors.
- Google Scholar counts over 2500 citations, 7 papers with more than 100 citations, h-index of 26, and i10-index of 34 (as of November 2024).
- All my scientific papers are available at arXiv and at my personal website.
- All publications after I have moved to France may also be found at HAL.
- **A list with all my publications can be found at the end of this CV.**

Responsibilities

- Co-head (responsable adjoint) of the Quantum Information master program of Sorbonne University.

Research supervision

Worked in close relation with several students (undergrad, master, and PhD) with different backgrounds at various institutions.

- Concluded the co-supervision of 3 PhD students
- Concluded the co-supervision of 2 master theses

- Concluded the supervision of 4 master internship projects
- Currently supervising 1 PhD student
- Currently supervising 2 master students

PhD co-supervision

Oct 2023 – Now **PhD co-supervision**, *Sorbonne Université*, Paris, France
Student name: Vanessa Brzić
Main supervisor: Damian Markham
Project name: Higher-Order Quantum Operations: Foundations and Applications

Oct 2023 – Now **PhD co-supervision**, *Sorbonne Université*, Paris, France
Student name: Kim Vallée
Main supervisor: Damian Markham
Project name: Bell nonlocality and contextuality

Sept 2020 – Aug 2022 **PhD co-supervision**, *University of Vienna*, Vienna, Austria
Student name: Martin Renner
Main supervisor: Časlav Brukner
Thesis title: Quantifying the nonlocality of two-qubit states and quantum computation with indefinite causal structures
PhD defended on the 28/11/2024

Jun 2017 – Jan 2022 **PhD co-supervision**, *UFMG*, Belo Horizonte, Brazil
Student name: Marcello Nery
Main supervisor: Reinaldo Vienna
Thesis title: Non-classical common-cause and direct-cause
PhD defended on the 21/01/2022

Jan 2018 – Dec 2020 **PhD co-supervision**, *The University of Tokyo*, Tokyo, Japan
Student name: Qingxiuxiong Dong
Main supervisor: Mio Murao
Thesis title: Quantum algorithms for higher-order quantum transformations of universal unitary operations
PhD defended on the 02/2020

Hosting PhD secondments

Mar 2024 – Avr 2024 **PhD secondments**, *Sorbonne Université*, Paris, France
Student name: Ties Ohst
Main supervisor: Otfried Gühne
Project title: Quantum memory in causally ordered processes of universal unitary operations

Master's thesis co-supervistion

Jul 2018 – Jul 2020 **MSc co-supervisor**, *The University of Tokyo*, Tokyo, Japan
Student name: Wataru Yokojima
Main supervisor: Mio Murao
Thesis title: Consequences of preserving reversibility in quantum superchannels
MsC defended on the 02/2020

Jun 2017 – Jan 2018 **MSc co-supervisor**, *The University of Tokyo*, Tokyo, Japan
Student name: Qingxiuxiong Dong
Main supervisor: Mio Murao
Thesis title: Quantum implementability of maps and supermaps
MsC defended on the 02/2018

Master's internship supervistion

Feb 2024 – Feb 2024 **Master's internship supervisor**, *Sorbonne Université*, Paris, France
Yuki Koizumi
Project name: Equivalence between unitary estimation and deterministic port-based teleportation

Jan 2024 – Apr 2024 **Master's internship supervisor**, *Sorbonne Université*, Paris, France
Shijun Zhang
Project name: Perfect discrimination of unitary operations when k calls are available

Apr 2023 – Jun 2023 **Master's internship supervisor**, *Sorbonne Université*, Paris, France
Shijun Zhang
Project name: Perfect discrimination of unitary operations when k calls are available

Apr 2023 – Jun 2023 **Master's internship supervisor**, *Sorbonne Université*, Paris, France
Charbel Eid
Project name: Optimal discrimination between quantum measurements and instruments

Apr 2023 – Jun 2023 **Master's internship supervisor**, *Sorbonne Université*, Paris, France
Ethan Obadia
Project name: Quantum channel discrimination with partially entangled states

Participation in examination board

I was a member of the jury (and a reporter) for 5 PhD defences and 2 MSc defences.

Members of PhD jury

17 Dec 2024 **Jury of PhD Thesis defence**, *Unicamp*, Campinas, Brazil
Student name: Lucas Pollyceno
Thesis title: Multipartite Bell nonlocality and communication
Supervisor: Rafael Rabelo

23 Oct 2023 **Jury of PhD Thesis defence**, *Technical University of Denmark Department of Physics*, Copenhagen, Denmark
Student name: Carles Roch i Carceller
Thesis title: Quantum state discrimination with applications in contextuality and randomness certification
Supervisor: Johnatan Bohr Brask

12 Jun 2023 **Jury of PhD Thesis defence**, *Université libre de Bruxelles*, Brussels, Belgium
Student name: Jef Pauwels
Thesis title: Entanglement and quantum communication between partially characterized devices
Supervisor: Stefano Pironio

10 Mar 2023 **Jury of PhD Thesis defence**, *Unicamp*, Campinas, Brazil
Student name: Carlos Humberto de Souza Vieira
Thesis title: Exploring the role of entanglement in sets of behaviors from prepare-and-measure scenarios
Supervisor: Marcelo Terra Cunha

03 Feb 2022 **Jury of PhD Thesis defence**, *Unicamp*, Campinas, Brazil
Student name: Roberto Dobal Baldijão
Thesis title: Quantum Darwinism And Contextuality
Supervisor: Marcelo Terra Cunha

Members of MSc jury

31 Jan 2024 **Jury of MSc Thesis defence**, *UNICAMP*, Campinas, Brazil
Student name: Arthur Couto Rosa Dutra de Oliveira
Thesis title: Can KS-Contextuality Hide in a Crowd? Investigating state-independent contextuality in systems with multiple observers.
Supervisor: Marcelo Terra Cunha

09 Apr 2021 **Jury of MSc Thesis defence**, *UNICAMP*, Campinas, Brazil
Student name: Lucas da S. Pollyceno
Thesis title: Novos critérios para o princípio da causalidade de informação
Supervisor: Marcelo Terra Cunha

Participation on a comité de suivi individuel de thèse (CSI)

08 Oct 2024 **External member of the jury**, *Sorbonne University*, Paris, France
Student name: Youness Ayaita
Projet de thèse: Le raisonnement ampliatif
Supervisor: Anouk Barberousse

08 Jul 2024 **External member of the jury**, *Université Grenoble Alpes*, Grenoble, France
Student name: Pierre Pocreau
Projet de thèse: Implications of causal indefiniteness for quantum communication
Supervisor: Mehdi Mhalla
Co-Supervisor: Alastair Abbott

01 Jul 2024 **External member of the jury**, *Université Paris-Saclay Alpes*, Palaiseau, France
Student name: Octave Mestoudjian
Projet de thèse: Sous-systèmes généralisés en informatique quantique
Supervisor: Pablo Arrighi
Co-Supervisor: Augustin Vanrietvelde

21 Jun 2023 **External member of the jury**, *Université Grenoble Alpes*, Grenoble, France
Student name: Pierre Pocreau
Projet de thèse: Implications of causal indefiniteness for quantum communication
Supervisor: Mehdi Mhalla
Co-Supervisor: Alastair Abbott

Teaching summary

A detailed list of my teaching experience is presented at the end of this CV.
- More than 80h of course teaching
- More than 280h of tutorials
- Responsible for creating/reformulating the courses "Quantum Circuit and Logic Gates" and "QIIntro" from the Quantum Information master program of Sorbonne University.

Brief description of recent teaching

Undergraduate level in computer science at Sorbonne Université:
- Mathématiques Discrètes (TD/TP, 2x)
- Introduction à la calculabilité et à la décidabilité (TD/TP 2x)

Mater level in the quantum information master at Sorbonne Université:
- Quntum circuits and logic gates (Cours et TD, 2x)
- QIIntro (Cours et TD 1x)
- Quantum kinematics for CS (TD 1x)
- Théorie de Shannon classique et quantique (Cous et TD 2x)

Mater level (outside of the quantum domain) at Sorbonne Université
- Analyse d'algorithmes et génération aléatoire (TD/TP, 1x)

Outreach and dissemination

During my JSPS postdoc in Japan, I have joined the JSPS Science Dialogue Program, a project where I presented my research in an accessible way to Japanese high-school students. I am also interested in popular science events.

21 Sep 2018 **JSPS Science Dialogue**, Nagano prefecture Suwa-Seiryo High School, Japan
What do you mean by random? Randomness, Quantum Mechanics, and Bell Non-locality

05 Dec 2017 **JSPS Science Dialogue**, Ibaraki prefecture Takezono High School, Japan
What do you mean by random? Randomness, Quantum Mechanics, and Bell Non-locality

07 Jan 2013 **Science Slam Berlin**, SO36, Berlin, Germany
Does God play dice? Genuine randomness in nature

Reviewing activities

Referee for the journals: Quantum, PRL, PRX, PRX Quantum, PRA, PRResearch, J. Math. Phys, NJP, J. Phys. A, npj Quantum Information, Optica.

I have also refereed submissions for conferences such as QIP, TQC, and AQIS.

Scientific Conferences

- Organised 1 workshop
- Member of the program committee of 4 conferences
- Invited to present a talk in 5 conferences
- Talk accepted in 20 conferences
- Poster accepted in 15 conferences

Organisation

Dec 2023 **Japanese-French Quantum Information 2023 Workshop**, Tokyo, Japan

Program Committee

Sep 2024 **Causalworlds**, Waterloo, Canada

Sep 2024 **AQIS24 Sapporo**, Sapporo, Japan

Sep 2019 **YQIS2019**, Gdansk/Sopot, Poland

Sep 2018 **YQIS2018**, Vienna, Austria

Invited Talk

Apr 2022 **Tsirelson Memorial Workshop**, Vienna, Austria
Talk: Measurement incompatibility and Bell nonlocality: from 1985 to 2022

Mar 2020 **The Order of Things (TOOT)**, Obergurgl, Austria
Conference cancelled due to COVID19 pandemic

Jan 2020 **Quantum Information Structure of Spacetime (QISS) 2020**, Hong Kong
Talk: Reversing unknown quantum transformations: A universal quantum circuit for inverting general unitary operations

Nov 2018 **Quantum Maiwar**, Brisbane, Australia
Talk: Semi-device-independent certification of indefinite causal order

Oct 2017 **FQXi Workshop: Quantum Incompatibility** , Laach Lake, Germany
Talk: Genuine n-wise Measurement Incompatibility and Device Independent Certificates of Incompatibility

Accepted Talks

Aug 2023 **Asian Quantum Information Science 2024 (AQIS24)**, Sapporo, Japan
Talk: Simulating the quantum switch using causally ordered circuits requires at least an exponential overhead in query complexity
(presented by Satoshi Yoshida)

Aug 2023 **Asian Quantum Information Science 2023 (AQIS2023)**, Seoul, South Korea
Talk: Simulating qubit correlations with classical communication

Fev 2023 **Quantum Information Processing 2023 (QIP2023)**, Ghent, Belgium
Talk: Simulating qubit correlations with classical communication
(presented by Martin J. Renner)

Sep 2021 **SFB BeyondC Autumn Workshop 2021**, Innsbruck, Austria
Talk: Universal protocols for transforming unitary quantum operations

Jun 2021 **Quantum Physics and Logic 2021 (QPL2021)**, Gdańsk (Online), Poland
Talk: Success-or-draw: A strategy allowing repeat-until-success in quantum computation

Jan 2020 **Quantum Information Processing 2020 (QIP2020)**, Shenzhen, China
Talk: Adaptive circuits exponentially outperforms parallel ones for universal unitary inversion

Aug 2019 **Asian Quantum Information Science 2019 (AQIS2019)**, Seoul, South Korea
Talk: Semi-device-independent certification of indefinite causal order

Sep 2018 **post AQIS18**, Nagoya, Japan
Talk: Reversing unknown quantum transformations

Sep 2018 **Asian Quantum Information Science 2018 (AQIS2018)**, Nagoya, Japan
Talk: Reversing unknown quantum transformations

Jul 2018 **Modern Topics in Quantum Information**, Natal, Brazil
Talk: Reversing unknown quantum transformations

May 2017 **36th Quantum Information Technology Symposium (QIT36)** , Kyoto, Japan
Talk: Super-activation of quantum steering

Mar 2016 **Quantum Networks (FQXi)**, Barcelona, Spain
Talk: Entangled States With Local Hidden Variable Model For Sequential Measurements

Dec 2015 **Quantum Correlations, Contextuality and All That... Again**, Natal, Brazil
Talk: Algorithmic construction of local hidden variable models for entangled quantum states

Aug 2015 **V Quantum Information School and Workshop**, Paraty, Brazil
Talk: Joint measurability, EPR steering, and Bell nonlocality

Aug 2014 **Asian Quantum Information Science 2014 (AQIS2014)**, Kyoto, Japan
Talk: Joint measurability, EPR steering, and Bell nonlocality

Dec 2013 **Quantum Correlations, Contextuality and All That**, Natal, Brazil
Talk: Measurement Incompatibility in Quantum Mechanics

Aug 2013 **IV Quantum Information School and Workshop**, Paraty, Brazil
Talk: Genuine Hidden Quantum Nonlocality

Jun 2012 **Workshop on Quantum Correlations**, Natal, Brazil
Talk: All noncontextuality inequalities for the n-cycle scenario

Dez 2011 **III Encontro temático do INCT-IQ**, Natal, Brazil
Talk: From the detection loophole to the transmission loophole

Aug 2011 **III Quantum Information School and Workshop**, Paraty, Brazil
Talk: Maximal CHSH violations with low efficiency photodetection and homodyne measurements
Poster presentation

Sep 2021 **Time in quantum theory, ETH workshop**, Zurich (online), Switzerland
Poster: Universal quantum circuits for transforming unitary operations: exponential advantages with causality adaptive strategies and the power of indefinite causality

Sep 2021 **Vienna Quantum Foundations Conference (VQF-CON 2021)**, Vienna , Austria
Poster: Universal quantum circuits for transforming unitary operations: exponential advantages with causality adaptive strategies and the power of indefinite causality

Jun 2020 **Theory of Quantum Computation, Communication and Cryptography 2020 (TQC2020)**, Riga (online), Latvia
Poster: Adaptive circuits exponentially outperforms parallel ones for universal unitary inversion

Dec 2019 **Topical Conference on Quantum Communication and Security 2019 (TCQC2019)**, Kyoto, Japan
Poster: Reversing unknown quantum transformations: A universal quantum circuit for inverting general unitary operations

Aug 2019 **Asian Quantum Information Science 2019 (AQIS2019)**, Seoul, South Korea
Poster: Distributed sampling, quantum communication witnesses, and measurement incompatibility

Apr 2018 **International Conference on challenges in Quantum Information Science (CQIS18)**, Tokyo, Japan
Poster: The Cost of Implementing Non-Completely Positive Linear Maps

Jan 2014 **Quantum Information Processing 2014 (QIP2014)**, Barcelona, Spain
Poster: Genuine Hidden Quantum Nonlocality

Aug 2013 **IV Quantum Information School and Workshop**, Paraty, Brazil
Poster: Realistic loophole-free Bell test with atom-photon entanglement

Jan 2013 **Quantum Information Processing 2013 (QIP2013)**, Beijing, China
Poster: Towards a loophole-free Bell test with continuous variables systems

May 2012 **TQC2012**, Tokyo, Japan
Poster: Perfect homodyne measurements implies CHSH violation with arbitrarily low photodetection efficiency

Nov 2010 **XIX Semana da Iniciação Científica**, *UFMG*, Belo Horizonte, Brazil
Poster: Jogo do Quadrado Mágico; Pseudotelepatia Quântica

Nov 2010 **V Simpósio Nacional / Jornadas de Iniciação Científica**, *IMPA*, RJ, Brazil
Poster: Não-localidade como recurso para comunicação

Oct 2010 **WECIQ2010**, Petrópolis, Brazil
Poster: Jogo do Quadrado Mágico; Pseudotelepatia Quântica

Oct 2009 **XVIII Semana da Iniciação Científica**, *UFMG*, Belo Horizonte, Brazil
Poster: Algoritmo de Grover – Selected to the top 8%

Oct 2008 **XVII Semana da Iniciação Científica**, *UFMG*, Belo Horizonte, Brazil
Poster: Números Inteiros e Criptografia RSA

Participation

Avr 2024 **QFoundations of Quantum Physics beyond Bell: Celebrating 60 years of Bell's theorem**, Les Diablerets, Switzerland

Jun 2019 **Quantum Information (Benasque)**, Benasque, Spain
Workshop without formal talks

Jun 2017 **Quantum Information (Benasque)**, Benasque, Spain
Workshop without formal talks

Jun 2015 **Quantum Information (Benasque)**, Benasque, Spain
Workshop without formal talks

Aug 2015 **V Quantum Information School and Workshop**, Paraty, Brazil

Sep 2015 **Gisin's 60th birthday workshop**, Riederalp, Switzerland

Jun 2013 **Quantum Information (Benasque)**, Benasque, Spain
Workshop without formal talks

Aug 2013 **IV Quantum Information School**, Paraty, Brazil

Jul 2012 **62nd Lindau Nobel Laureate Meeting dedicated to Physics**, Lindau, Germany

Aug 2011 **III Quantum Information School and Workshop**, Paraty, Brazil

Jul 2011 **28o Colóquio Brasileiro de Matemática**, *IMPA*, Rio de Janeiro, Brazil

Aug 2010 **XIV Escola Brasileira de Probabilidade**, Búzios, Brazil

Jul 2010 **Clay Mathematics Institute 2010 Summer School**, *Probability and Statistical Physics in Two and more Dimensions*, Búzios, Brazil

Academic visit seminars

08 Jul 2024 **Université Grenoble Alpes**, Grenoble, France
Talk: All incompatible measurements on qubits lead to multiparticle Bell nonlocality
Host: Alastair Abbott

25 Jun 2024 **University of Pisa**, Pisa, Italy
Talk: The relationship between measurement incompatibility and Bell nonlocality
Host: Costantino Budroni

24 Oct 2023 **Technical University of Denmark, QPIT**, Copenhagen, Denmark
Talk: Transforming and discriminating quantum operations using higher-order methods
Host: Johnatan Bohr Brask

16 Mar 2023 **Les Atelier du LKB, Laboratoire Kastler Brossel**, Paris, France
Talk: Parallel, sequential, and non-causal strategies for transforming unitary operations and discriminating quantum channel via a higher-order approach.
Host: Nancy Paul

10 Dec 2021 **University of Gdańsk**, Gdańsk, Poland
Talk: Transforming unitary operations via quantum circuits:Universal unitary inversion, transposition, and complex conjugation
Host: Michał Studziński

18 Mar 2021 **Quantin research group**, Warsaw (online), Poland
Talk: Universal protocols for transforming unitaryquantum operations
Host: Michał Oszmaniec

05 Feb 2021 **Technical University of Denmark**, Copenhagen (online), Denmark
Talk: Reversing unknown quantum transformations: A universal protocol for inverting general unitary operations
Host: Jonatan Bohr Brask

10 Jul 2019 **Universitat Autònoma de Barcelona**, Barcelona, Spain
Talk: Reversing unknown quantum transformations: A universal protocol for inverting general unitary operations
Host: Andreas Winter

14 Feb 2019 **ICFO**, Barcelona, Spain
Talk: Reversing unknown quantum transformations: A universal protocol for inverting general unitary operations
Host: Antonio Ácin

12 Feb 2019 **GAP**, Geneva, Switzerland
Talk: Reversing unknown quantum transformations: A universal protocol for inverting general unitary operations
Host: Nicolas Brunner

24 Jan 2019 **IQOQI Vienna**, Vienna, Austria
Talk: Reversing unknown quantum transformations: A universal protocol for inverting general unitary operations
Host: Marcus Huber

16 Dec 2016 **The University of Tokyo**, Tokyo, Japan
Talk: Super-Activation of Quantum Steering
Host: Mio Murao

18 Nov 2016 **UFMG**, Belo Horizonte, Brazil
Talk: Super-Activation of Quantum Steering
Host: Marcelo Terra Cunha

18 Nov 2015 **University of Siegen**, Siegen, Germany
Talk: Inequivalence of Entanglement, Steering, and Bell Nonlocality For General Measurements
Host: Otfried Gühne

18 Aug 2015 **UFMG**, Belo Horizonte, Brazil
Talk: Inequivalence of Entanglement, Steering, and Bell Nonlocality For General Measurements
Host: Marcelo Terra Cunha

31 Jul 2015 **UFMG**, BH, Brazil
Talk: Joint Measurability, EPR Steering, and Bell Nonlocality
Host: Marcelo Terra Cunha

15 Jun 2015 **Waseda University**, Tokyo, Japan
Talk: Joint Measurability, EPR Steering, and Bell Nonlocality
Host: Kazuya Yuasa

26 May 2015 **PI**, Waterloo, Canada
Talk: Joint Measurability, EPR Steering, and Bell Nonlocality
Host: Matthew Pusey

09 Oct 2014 **ICFO**, Barcelona, Spain
Talk: Joint Measurability, EPR Steering, and Bell Nonlocality
Host: Antonio Ácin

05 Sep 2014 **KCIK**, Gdansk, Poland
Talk: Joint Measurability, EPR Steering, and Bell Nonlocality
Host: Michał Horodecki

25 Aug 2014 **The University of Tokyo**, Tokyo, Japan
Talk: Joint Measurability, EPR Steering, and Bell Nonlocality
Host: Mio Murao

03 Dec 2013 **UFMG**, Belo Horizonte, Brazil
Genuine Hidden Quantum Nonlocality
Host: Marcelo Terra Cunha

19 Jul 2012 **KCIK**, Gdansk, Poland
Talk: Characterization of the n-Cycle Noncontextual Polytope
Host: Michał Horodecki

11 Jul 2012 **ICFO**, Barcelona, Spain
Talk: Characterization of the n-Cycle Noncontextual Polytope
Host: Antonio Ácin

List of publications

Peer-reviewed publications

[1] M.J. Renner, A. Tavakoli, and M.T. Quintino. "The classical cost of transmitting a qubit". *Phys. Rev. Lett.* **130** 120801 (2023).

[2] M.J. Renner and M.T. Quintino. "The minimal communication cost for simulating entangled qubits". *Quantum* **7** 1149 (2023).

[3] M. Nery, M.T. Quintino, P. A. Guérin, T. O. Maciel, and R. O. Vianna. "Simple and maximally robust processes with no classical common-cause or direct-cause explanation". *Quantum* **5** 538 (2021).

[4] M.T. Quintino, Q. Dong, A. Shimbo, A. Soeda, and M. Murao. "Reversing Unknown Quantum Transformations: Universal Quantum Circuit for Inverting General Unitary Operations". *Phys. Rev. Lett.* **123** 210502 (2019).

[5] M.T. Quintino, Q. Dong, A. Shimbo, A. Soeda, and M. Murao. "Probabilistic exact universal quantum circuits for transforming unitary operations". *Phys. Rev. A* **100** 062339 (2019).

[6] Q. Dong, M.T. Quintino, A. Soeda, and M. Murao. "Success-or-Draw: A Strategy Allowing Repeat-Until-Success in Quantum Computation". *Phys. Rev. Lett.* **126** 150504 (2021).

[7] Qingxiuxiong Dong, Marco Túlio Quintino, Akihito Soeda, and Mio Murao. "The quantum switch is uniquely defined by its action on unitary operations". *Quantum* **7** 1169 (2023).

[9] W. Yokojima, M.T. Quintino, A. Soeda, and M. Murao. "Consequences of preserving reversibility in quantum superchannels". *Quantum* **5** 441 (2021).

[10] Q. Dong, M.T. Quintino, A. Soeda, and M. Murao. "Implementing positive maps with multiple copies of an input state". *Phys. Rev. A* **99** 052352 (2019).

[12] L. Villegas-Aguilar, E. Polino, F. Ghafari, M. T. Quintino, K. T. Laverick, I. R. Berkman, S. Rogge, L. K. Shalm, N. Tischler, E. G. Cavalcanti, S. Slussarenko, and G. J. Pryde. "Nonlocality activation in a photonic quantum network". *Nature Communications* **15**, 3112 3112 (2024).

[13] P. Taranto, M. T. Quintino, M. Murao, and S. Milz. "Characterising the Hierarchy of Multi-time Quantum Processes with Classical Memory". *Quantum* **8** 1328 (2024).

[14] M. Antesberger, M.T. Quintino, P. Walther, and L. A. Rozema. "Higher-Order Process Matrix Tomography of a Passively-Stable Quantum Switch". *PRX Quantum* **5**, 010325 010325 (2024).

[15] S. Milz and M.T. Quintino. "Characterising transformations between quantum objects, 'completeness' of quantum properties, and transformations without a fixed causal order". *Quantum* **8** 1415 (2024).

[16] T. Strömberg, P. Schiansky, R.W. Peterson, M.T. Quintino, and P. Walther. "Demonstration of a quantum SWITCH in a Sagnac configuration". *Phys. Rev. Lett.* **131** 060803 (2023).

[17] T. Strömberg, P. Schiansky, M.T. Quintino, M. Antesberger, L. A. Rozema, I. Agresti, Č. Brukner, and P. Walther. "Experimental superposition of a quantum evolution with its time reverse". *Phys. Rev. Research* **6**, 023071 023071 (2024).

[18] D. Ebler, M. Horodecki, M. Marciniak, T. Młynik, M.T. Quintino, and M. Studziński. "Optimal universal quantum circuits for unitary complex conjugation". *IEEE Transactions on Information Theory* **69** 5069–5082 (2023).

[19] E.-C. Boghiu, F. Hirsch, P.-S. Lin, M.T. Quintino, and J. Bowles. "Device-independent and semi-device-independent entanglement certification in broadcast Bell scenarios". *SciPost Phys. Core* **6** 028 (2023).

[20] M.T. Quintino and D. Ebler. "Deterministic transformations between unitary operations: Exponential advantage with adaptive quantum circuits and the power of indefinite causality". *Quantum* **6** 679 (2022).

[21] H.-Y. Ku, J. Kadlec, A. Cernoch, M.T. Quintino, W. Zhou, K. Lemr, N. Lambert, A. Miranowicz, S.-L. Chen, F. Nori, and Y-N. Chen. "Quantifying Quantumness of Channels Without Entanglement". *PRX Quantum* **3** 020338 (2022).

[22] J. Bavaresco, M. Murao, and M.T. Quintino. "Unitary channel discrimination beyond group structures: Advantages of sequential and indefinite-causal-order strategies". *J. Math. Phys.* **63** 042203 (2022).

[23] A. Sohbi, D. Markham, J. Kim, and M.T. Quintino. "Certifying dimension of quantum systems by sequential projective measurements". *Quantum* **5** 472 (2021).

[24] J. Bavaresco, M. Murao, and M.T. Quintino. "Strict Hierarchy between Parallel, Sequential, and Indefinite-Causal-Order Strategies for Channel Discrimination". *Phys. Rev. Lett.* **127** 200504 (2021).

[25] M. Araújo, F. Hirsch, and M.T. Quintino. "Bell nonlocality with a single shot". *Quantum* **4** 353 (2020).

[26] M.T. Quintino, C. Budroni, E. Woodhead, A. Cabello, and D. Cavalcanti. "Device-Independent Tests of Structures of Measurement Incompatibility". *Phys. Rev. Lett.* **123** 180401 (2019).

[27] L. Guerini, M.T. Quintino, and L. Aolita. "Distributed sampling, quantum communication witnesses, and measurement incompatibility". *Phys. Rev. A* **100** 042308 (2019).

[28] J. Bavaresco, M. Araújo, Č. Brukner, and M.T. Quintino. "Semi-device-independent certification of indefinite causal order". *Quantum* **3** 176 (2019).

[29] F. Hirsch, M.T. Quintino, and N. Brunner. "Quantum measurement incompatibility does not imply Bell nonlocality". *Phys. Rev. A* **97** 012129 (2018).

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Under review

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Teaching details

2024/2 **Lecture (4h), Tutorial (2h)**, *Sorbonne Université, Master's d'Informatique - Information Quantique (IQ), M2*, Paris, France
MU5PYQ03 - QIT: Quantum Information Theory

2024/2 **Lecture (10h), Tutorial (8h)**, *Sorbonne Université, Master's d'Informatique - Information Quantique (IQ), M1*, Paris, France
MU4INQ05 - Quantum circuits and logic gates

2024/2 **Tutorial (38.5h)**, *Sorbonne Université, Lincese d'Informatique, L2*, Paris, France
LU2IN005 - Mathématiques Discrètes

2024/1 **Lecture (2h)**, *4EU+ European University Alliance*, University of Copenhagen (online), Denmark
4EU+: Quantum Information and Quantum Many-Body Theory

2024/1 **Lecture (10h), Tutorial (6h)**, *Sorbonne Université, Master's d'Informatique - Information Quantique (IQ), M1*, Paris, France
MU4INQ51 - QIIntro

2024/1 **Lecture (18h), Tutorial (6h)**, *Sorbonne Université, Master's Sciences, Technologies, Santé, M1.*, Paris, France
MU4PY223 - Théorie de Shannon classique et quantique

2024/1 **Tutorial (36.5h)**, *Sorbonne Université, Lincese d'Informatique, L3*, Paris, France
LU3IN030 - Introduction à la calculabilité et à la décidabilité

2023/2 **Lecture (4h), Tutorial (2h)**, *Sorbonne Université, Master's d'Informatique - Information Quantique (IQ), M2*, Paris, France
MU5PYQ03 - QIT: Quantum Information Theory

2023/2 **Lecture (10h, Tutorial (6h))**, *Sorbonne Université, Master's d'Informatique - Information Quantique (IQ), M1*, Paris, France
MU4INQ05 - Quantum circuits and logic gates

2023/2 **Tutorial (38.5h)**, *Sorbonne Université, Lincese d'Informatique, L2*, Paris, France
LU2IN005 - Mathématiques Discrètes

2023/1 **Lecture (15h), Tutorial (15h)**, *Sorbonne Université, Master's Sciences, Technologies, Santé, M1.*, Paris, France
MU4PY223 - Théorie de Shannon classique et quantique

2023/1 **Tutorial (36.5h)**, *Sorbonne Université, Lincese d'Informatique, L3*, Paris, France
LU3IN030 - Introduction à la calculabilité et à la décidabilité

2022/2 **Tutorial (36.5h)**, *Sorbonne Université, Lincese d'Informatique, L2*, Paris, France
LU2IN005 - Mathématiques Discrètes

2022/2 **Lecture (2h), Tutorial (16h)**, *Sorbonne Université, Master's d'Informatique - Information Quantique (IQ), M1.*, Paris, France
MU4INQ01 - Quantum kinematics for computer scientists

2022/2 **Tutorial (14h)**, *Sorbonne Université, Master's d'Informatique - Parcours Science et Technologie du Logiciel (STL), M2*, Paris, France
MU5IN550 - Analyse d'algorithmes et génération aléatoire

2022/2 **Lecture (6h), Tutorial (4h)**, *Sorbonne Université, Master's d'Informatique - Information Quantique (IQ), M2*, Paris, France
MU5PYQ03 - QIT: Quantum Information Theory

2021 **One lecture**, *Semana da Física 2021 – UNESP*, Caratinguetá (online), Brazil
Não-localidade de Bell: como o indeterminismo quântico permite correlações supra-clássicas

2019 **One lecture**, *The University of Tokyo*, Tokyo, Japan
What do you mean by random? Randomness, Quantum Mechanics, and Bell Non-locality – Undergraduate course in quantum technology

2016/1 **Teaching Assistant**, *Université de Genève*, Geneva, Switzerland
Quantum Information Theory – Master's Course

2015/2 **Teaching Assistant**, *Université de Genève*, Geneva, Switzerland
Méthodes mathématiques pour physiciens I – Undergraduate Course

2015/1 **Teaching Assistant**, *Université de Genève*, Geneva, Switzerland
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2014/1 **Teaching Assistant**, *Université de Genève*, Geneva, Switzerland
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2013/1 **Teaching Assistant**, *Université de Genève*, Geneva, Switzerland
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2011/1 **Teaching Assistant**, *IMPA*, Rio de Janeiro, Brazil
Mecanica quântica para matemáticos em formação – 28o Colóquio Brasileiro de Matemática

2011 **One lecture**, *UFMG*, Belo Horizonte, Brazil
Comunicação via qubits – XXII Escola de Inverno

2010 **One lecture**, *UFMG*, Belo Horizonte, Brazil
Desigualdades de Bell, uma introdução a não-localdiade quântica – Quantum Mechanics Graduate Course

2010 **One lecture**, *UFMG*, Belo Horizonte, Brazil
Desigualdades de Bell, uma introdução a não-localdiade quântica – Quantum Mechanics Graduate Course