

Jessica Bavaresco

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Position

Oct 2023 – **SNSF Postdoctoral Fellow** (*Maître Assistante*)
current Quantum Theory Group, Department of Applied Physics (GAP)
University of Geneva, Switzerland
Host: Prof. Nicolas Brunner
Funding: SNSF Swiss Postdoctoral Fellowship

Education

Mar 2017 – **PhD in Physics** University of Vienna, Vienna, Austria
Jun 2021 Thesis: *Certifying complex quantum properties: High-dimensional entanglement and indefinite causal order*
Graduated with honors, on 21 June 2021.
Supervisor: Prof. Marcus Huber
Mar – Jun **Secondment** The University of Tokyo, Tokyo, Japan
2019 Supervisor: Prof. Mio Murao
Aug 2014 – **Master in Physics** Federal University of Minas Gerais, Belo Horizonte, Brazil
Aug 2016 Thesis: *When Bob cannot trust Alice: A semi-device-independent tale of quantum steering*
Supervisor: Prof. Marcelo Terra Cunha
Mar 2010 – **Bachelor in Physics** Federal University of Santa Catarina, Florianópolis, Brazil
July 2014 Jan – Dec **Bachelor exchange programme** Lafayette College, Easton-PA, USA
2012 Supervisor: Prof. Anthony D. Novaco

Previous positions

Jun 2022 – **Postdoctoral researcher** – University of Geneva, **Switzerland**
Sep 2023 Group leader: Prof. Nicolas Brunner
Funding: NCCR SwissMAP (Switzerland)
Jul 2021 – **Postdoctoral researcher** – IQOQI Vienna, ÖAW, **Austria**
May 2022 Young Independent Research Group (YIRG)
Group leaders: Dr. Ämin Baumeler, Dr. Costantino Budroni, and Dr. Yelena Guryanova
Funding: FWF-Zukunftskolleg (Austria)
Mar – Jun **Visiting PhD student** – The University of Tokyo, **Japan**
2019 Group leader: Prof. Mio Murao
Funding: FWF-START Prize (Austria)
Oct 2016 – **Praedoctoral researcher** – IQOQI Vienna, ÖAW, **Austria**
Jun 2021 Group leader: Prof. Marcus Huber
Funding: FWF-START Prize (Austria)

Student research

- Aug 2014 – **CAPES master’s research student** – Federal University of Minas Gerais, **Brazil**
Jul 2016 Supervisor: Prof. Marcelo Terra Cunha (Quantum Information Theory)
Funding: CAPES Federal Master’s research stipend (Brazil)
- Aug 2013 – **PIBIC undergrad research student** – Federal University of Santa Catarina, **Brazil**
Jul 2014 Supervisor: Prof. Eduardo Duzzioni (Quantum Information Theory)
Funding: CNPq Federal Bachelor research stipend (Brazil)
- May – Dec 2012 **Excel Scholar research student** – Lafayette College, **USA**
Supervisor: Prof. Anthony D. Novaco (Condensed Matter Theory)
Funding: Excel Scholar program, Lafayette College (USA)
- Aug 2010 – **PIBIC undergrad research student** – Federal University of Santa Catarina, **Brazil**
Dec 2011 Supervisor: Prof. Abílio Mateus Jr (Astrophysics)
Funding: CNPq Federal Bachelor research stipend (Brazil)

Fellowships and awards

- Jun 2023 **SNSF Swiss Postdoctoral Fellowship** (“Swiss MSCA”)
Swiss National Science Fund (Switzerland): 250k CHF ~ 260k EUR
PI of Project: *Beyond Entangled Pairs: Quantum Correlations in Networks (BEPQCiN)*
- Feb 2023 **MSCA Individual Postdoc Fellowship** (Global Fellowship)
Score: 96.2% – Top 8.77% of candidates
European Research Executive Agency (EU): 300k EUR
PI of Project: *Beyond Entangled Pairs: Quantum Correlations in Networks (BEPQCiN)*
- Oct 2017 **ESQ Discovery Grant**
Austrian Academy of Sciences (Austria): 15k EUR
PI of Project: *Mutually unbiased bases – the notorious case of dimension 6.*
Research grant that supports innovative and high-risk projects, awarded in the first year of my PhD.
- Jun 2014 **Federal Master’s Research Stipend**
CAPES (Brazil): 36k BRL ~ 11k EUR
Two-year research stipend awarded through the selection process of UFMG, Brazil
- Sep 2011 **Science Without Borders Grant**
CAPES (Brazil): ca. 100k BRL ~ 44k EUR
Excellence-based fully funded one-year bachelor scholarship at Lafayette College, USA.

Memberships in panels or boards

- Nov 2023 **PhD jury member** of Timothée Hoffreumon, supervised by Dr. Ognian Oreshkov at the Université libre de Bruxelles, Belgium.
- Jun 2023 – **Steering Committee** of YQIS – International Conference Young Quantum Information Scientists.
current

Organization activities

- Mar 2023 – **Organizer of the weekly seminars** of the Quantum Theory Group of the Department of Applied Physics of the University of Geneva. Geneva, Switzerland.
- Sep 2018 **Local organization committee** of [YQIS-CoQuS 2018](#) – IV International Conference for Young Quantum Information Scientists and Summer School of the Vienna Doctoral Program in Complex Quantum Systems. Vienna, Austria.
- Aug 2015 **Assistant to the local organization committee** of V Paraty Quantum Information School and Workshop. Paraty, Brazil.

Supervision

- Jun – Oct 2023 **Internship co-supervisor** of Fatemeh Moradi at the University of Geneva, Switzerland.

Teaching

- Feb – May 2023 **Teaching assistant**, *Méthodes Mathématiques pour Physiciens I* (Mathematical Methods for Physicists I), Bachelor's course, University of Geneva, Switzerland.
- Sep – Dec 2022 **Teaching assistant**, *Méthodes Mathématiques pour Physiciens I* (Mathematical Methods for Physicists I), Bachelor's course, University of Geneva, Switzerland.

Publications and research output

A full list of publications is also available in [my Google Scholar page](#), which jointly counts over **560 citations** (Nov 2023). All research articles can be found in [my arXiv page](#).

Published

- [P1] H. Cao*, **J. Bavaresco***, N.-N. Wang, L.A. Rozema, C. Zhang, Y.-F. Huang, B.-H. Liu, C.-F. Li, G.-C. Guo, and P. Walther citations: 10
Semi-device-independent certification of indefinite causal order in a photonic quantum switch
[Optica](#) **10**, 561 (2023) [arXiv:2202.05346 \[quant-ph\]](#) (2022)
*These authors contributed equally to this work.
- [P2] S. Milz, **J. Bavaresco**, and G. Chiribella citations: 11
Resource theory of causal connection
[Quantum](#) **6**, 788 (2022)
[arXiv:2110.03233 \[quant-ph\]](#)
- [P3] H. Yamasaki, S. Morelli, M. Miethlinger, **J. Bavaresco**, N. Friis, and M. Huber citations: 9
Activation of genuine multipartite entanglement: Beyond the single-copy paradigm of entanglement characterisation
[Quantum](#) **6**, 695 (2022)
[arXiv:2106.01372 \[quant-ph\]](#)
- [P4] **J. Bavaresco**, M. Murao, and M. T. Quintino citations: 13
Unitary channel discrimination beyond group structures: Advantages of sequential and indefinite-causal-order strategies
[Journal of Mathematical Physics](#) **63**, 042203 (2022)
[arXiv:2105.13369 \[quant-ph\]](#) (2021)

- [P5] **J. Bavaresco**, M. Murao, and M. T. Quintino citations: 38
 Strict hierarchy between parallel, sequential, and indefinite-causal-order strategies for channel discrimination
[Physical Review Letters **127**, 200504 \(2021\)](#)
[arXiv:2011.08300 \[quant-ph\]](#)
- [P6] Y. Chen, S. Ecker, **J. Bavaresco**, T. Scheidl, L. Chen, F. Steinlechner, M. Huber, citations: 30
 and R. Ursin
 Verification of high-dimensional entanglement generated in quantum interference
[Physical Review A **101**, 032302 \(2020\)](#)
[arXiv:1910.07684 \[quant-ph\]](#)
- [P7] **J. Bavaresco**, M. Araújo, Č. Brukner, and M. T. Quintino citations: 24
 Semi-device-independent certification of indefinite causal order
[Quantum **3**, 176 \(2019\)](#)
[arXiv:1903.10526 \[quant-ph\]](#)
- [P8] **J. Bavaresco**, N. H. Valencia, C. Klöckl, M. Pivoluska, P. Erker, N. Friis, M. Malik, citations: 164
 and M. Huber
 Measurements in two bases are sufficient for certifying high-dimensional entanglement
[Nature Physics **14**, 1032 \(2018\)](#)
[arXiv:1709.07344 \[quant-ph\]](#)
- [P9] A. D. Novaco and **J. Bavaresco** citations: 1
 Simulations of submonolayer Xe on Pt(111): The case for a chaotic low temperature phase
[Journal of Chemical Physics **148**, 144704 \(2018\)](#)
[arXiv:1708.01493 \[cond-mat.mtrl-sci\]](#)
- [P10] L. Guerini, **J. Bavaresco**, M. Terra Cunha, and A. Acín citations: 53
 Operational framework for quantum measurement simulability
[Journal of Mathematical Physics **58**, 092102 \(2017\)](#)
[arXiv:1705.06343 \[quant-ph\]](#)
- [P11] **J. Bavaresco**, M. T. Quintino, L. Guerini, T. O. Maciel, D. Cavalcanti, and M. Terra Cunha citations: 39
 Most incompatible measurements for robust steering tests
[Physical Review A **96**, 022110 \(2017\)](#)
[arXiv:1704.02994 \[quant-ph\]](#)
- [P12] F. Steinlechner, S. Ecker, M. Fink, B. Liu, **J. Bavaresco**, M. Huber, T. Scheidl, citations: 144
 and R. Ursin
 Distribution of high-dimensional entanglement via an intra-city free-space link
[Nature Communications **8**, 15971 \(2017\)](#)
[arXiv:1612.00751 \[quant-ph\]](#)
- [P13] A. D. Novaco, L. W. Bruch, and **J. Bavaresco** citations: 3
 Incipient triple point for adsorbed xenon monolayers: Pt(111) versus graphite substrates
[Physical Review B **91**, 161412\(R\) \(2015\)](#)
[arXiv:1601.00700 \[cond-mat.mtrl-sci\]](#)

Pre-print

- [P14] **J. Bavaresco**, P. Lipka-Bartosik, P. Sekatski, and M. Mehboudi
 Designing protocols for Bayesian quantum parameter estimation with higher-order operations

Theses

- [T1] **J. Bavaresco.** Certifying complex quantum properties: High-dimensional entanglement and indefinite causal order. [Doctoral Thesis, Universität Wien \(2021\)](#).
- [T2] **J. Bavaresco.** When Bob cannot trust Alice: A semi-device-independent tale of quantum steering. [Master's Thesis, Universidade Federal de Minas Gerais \(2016\)](#).

Code repositories

- [R1] **J. Bavaresco,** <https://github.com/jessicabavaresco>.
Open-access online code repository, containing code pertaining to the research that led to different publications listed above.

■ Talks in conferences, workshops, and academic visits

Invited Talks in International Conferences

- Sep 2022 **Quantum Intelligence Workshop 2022.** Birr, Ireland.
“Resource theory of causal connection”
- Mar 2020 **TOOT 2020 – The Order of Things.** Obergurgl, Austria.
Conference cancelled due to COVID-19. Later realized as a small workshop in 2023 in Pisa, Italy.
“Correlations from boxworld processes”

Contributed Talks in International Conferences

- Aug 2023 **AQIS 2023 – 23rd Asian Quantum Information Science Conference.** Seoul, South Korea.
Long talk (single track): *“Unitary channel discrimination beyond group structures: Advantages of sequential and indefinite-causal-order strategies”*
- Aug 2023 **AQIS 2023 – 23rd Asian Quantum Information Science Conference.** Seoul, South Korea.
(Abstract submitted by Jessica Bavaresco; talk presented by Hayata Yamasaki)
“Activation of genuine multipartite entanglement: Beyond the single-copy paradigm of entanglement characterisation”
- Apr 2021 **YQIS 2021 – VI Int. Conference for Young Quantum Information Scientists.** Michigan, USA.
“Strict hierarchy between parallel, sequential, and indefinite-causal-order strategies for channel discrimination”
- Jun 2020 **TQC 2020 – 15th Conf. Theory of Quantum Comput., Commun. and Crypt.** Riga, Latvia.
“Semi-device-independent certification of indefinite causal order”
- Aug 2019 **AQIS 2019 – 19th Asian Quantum Information Science Conference.** Seoul, South Korea.
(Abstract submitted by Jessica Bavaresco; unable to attend – talk presented by Marco Túlio Quintino)
“Semi-device-independent certification of indefinite causal order”
- Nov 2018 **Q-turn 2018 – Changing Paradigms in Quantum Science.** Florianópolis, Brazil.
(Abstract submitted by Jessica Bavaresco; unable to attend – talk presented by Matej Pivoluska)
“Measurements in two basis are sufficient for certifying high-dimensional entanglement”

- Aug 2018 **Modern Topics on Quantum Information Science.** Natal, Brazil.
“Measurements in two basis are sufficient for certifying high-dimensional entanglement”
- Apr 2018 **CQIS 2018** – Int. Conference for Challenges in Quantum Information Science. Tokyo, Japan.
“Measurements in two basis are sufficient for certifying high-dimensional entanglement”
- Oct 2017 **38. SFB Meeting.** Vienna, Austria.
“Measurements in two basis are sufficient for certifying high-dimensional entanglement”

Invited Talks in Research Groups

- Nov 2023 **University of Bristol** – Group of Prof. Paul Skrzypczyk. Bristol, UK.
- Nov 2023 **Free University of Brussels (ULB)** – Group of Dr. Ognian Oreshkov. Brussels, Belgium.
- Oct 2023 **University of Warsaw** – Group of Prof. Rafal Demkowicz-Dobrzanski. Warsaw, Poland.
- Oct 2023 **Nanyang Technological University (NTU)** – Group of Prof. Mile Gu. Singapore.
- Oct 2023 **Université Grenoble Alpes (UGA)** – Group of Dr. Cyril Branciard (CNRS). Grenoble, France
- Dec 2022 **The University of Tokyo** – Group of Prof. Mio Murao. Tokyo, Japan.
- Nov 2021 **Ulm University** – Group of Prof. Martin Plenio. Ulm, Germany.
- Nov 2021 **National University of Singapore (NUS)** – Group of Prof. Valerio Scarani. Singapore.
- May 2021 **Autonomous University of Barcelona (UAB)** – Group of Prof. Andreas Winter. Barcelona, Spain.
- Mar 2021 **Chapman University** – Group of Prof. Matthew Leifer. Orange, USA.
- Jun 2020 **S. University of Campinas (UNICAMP)** – Group of Prof. Marcelo Terra Cunha. Campinas, Brazil.
- Oct 2018 **University of Vienna** — Group of Prof. Anton Zeilinger. Vienna, Austria
- Apr 2018 **University of Nagoya** – Group of Prof. Francesco Buscemi. Nagoya, Japan.
- Apr 2018 **The University of Tokyo** – Group of Prof. Mio Murao. Tokyo, Japan.
- Aug 2017 **F. University of Minas Gerais (UFMG)** – Group of Prof. Pablo Saldanha. Belo Horizonte, Brazil.
- Feb 2017 **ICFO** – Group of Prof. Antonio Acín. Castelldefels (Barcelona), Spain.

Outreach Activities

- Oct 2019 Member of discussion panel and Q&A session with non-STEM students of the course on Methods of Science and Practice in Physics. University of Vienna, Austria.
- May 2019 Teaching assistant on one-time lecture to first-year non-physics bachelor students of the course on Quantum Technologies, titled *“What do you mean by random? Randomness, Quantum Mechanics, and Bell Non-locality”*. The University of Tokyo, Japan.
- Jul 2018 Press releases concerning our result about high-dimensional entanglement (publication [P8] J. Bavaresco et al., [Nature Physics 14, 1032 \(2018\)](#)) to the general public at [Der Standard \(Austria\)](#), [ORF \(Austria\)](#), [Salzburger Nachrichten \(Austria\)](#), [Phys.org \(UK\)](#), [Catalunya Vanguardista \(Spain\)](#), and [Innovations Report \(Germany\)](#).
- May 2018 Invited speaker for an informal talk about quantum physics at a dinner for women interested in STEM topics and living in Vienna, organized by the group “Woman of Vienna STEM”. Vienna, Austria.

Other activities and skills

Referrals: Reviewer for the journals Physical Review Letters, Physical Review A, New Journal of Physics, Quantum Journal, Quantum Information Processing, European Physics Journal Plus, and the conferences TQC 2022 and QIP 2024.

Languages: Portuguese (native), English (fluent), French (intermediary), German (intermediary), Japanese (beginner).

Programming and software skills: MATLAB (with expertise on semidefinite programming), Mathematica, Fortran.