

Jessica Bavaresco

Rue de l'Ecole-de-Médecine 20, 1205 Geneva, Switzerland

+41 22 379 05 00

jessica.bavaresco@unige.ch

<https://jessicabavaresco.github.io>

<https://www.unige.ch/gap/qic/theory/team>



Position

as of **Scientific Collaborator (SNSF Postdoctoral Fellow)**
Oct 2023 – Quantum Theory Group, Department of Applied Physics (GAP)
University of Geneva, 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)

Aug 2014 – **CAPES master’s research student** – Federal University of Minas Gerais, **Brazil**
 Jul 2016
 Group leader: Prof. Marcelo Terra Cunha
 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
 Fully funded one-year bachelor scholarship at Lafayette College, USA.

Memberships in panels or boards

Jun 2023 – **Steering Committee member** of YQIS – International Conference Young Quantum Information
 current Scientists.

Supervision

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

Teaching

Feb – May 2023	Teaching assistant , <i>Méthodes Mathématiques pour Physiciens I</i> (Mathematical Methods for Physicists I), Bachelor's course, University of Geneva, Switzerland
Sep – Dec 2022	Teaching assistant , <i>Méthodes Mathématiques pour Physiciens I</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 **530 citations** (Sep 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) (open access)
[arXiv:2202.05346 \[quant-ph\] \(2022\)](#) (open access)
*These authors contributed equally to this work.
- [P2] S. Milz, **J. Bavaresco**, and G. Chiribella citations: 10
Resource theory of causal connection
[Quantum](#) **6**, 788 (2022) (open access)
[arXiv:2110.03233 \[quant-ph\] \(open access\)](#)
- [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) (open access)
[arXiv:2106.01372 \[quant-ph\] \(open access\)](#)
- [P4] **J. Bavaresco**, M. Murao, and M. T. Quintino citations: 12
Unitary channel discrimination beyond group structures: Advantages of sequential and indefinite-causal-order strategies
[Journal of Mathematical Physics](#) **63**, 042203 (2022)
[arXiv:2105.13369 \[quant-ph\] \(2021\)](#) (open access)
- [P5] **J. Bavaresco**, M. Murao, and M. T. Quintino citations: 37
Strict hierarchy between parallel, sequential, and indefinite-causal-order strategies for channel discrimination
[Physical Review Letters](#) **127**, 200504 (2021)
[arXiv:2011.08300 \[quant-ph\] \(open access\)](#)
- [P6] Y. Chen, S. Ecker, **J. Bavaresco**, T. Scheidl, L. Chen, F. Steinlechner, M. Huber, and R. Ursin citations: 29
Verification of high-dimensional entanglement generated in quantum interference
[Physical Review A](#) **101**, 032302 (2020)
[arXiv:1910.07684 \[quant-ph\] \(open access\)](#)
- [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) (open access)
[arXiv:1903.10526 \[quant-ph\] \(open access\)](#)

- [P8] **J. Bavaresco**, N. H. Valencia, C. Klöckl, M. Pivoluska, P. Erker, N. Friis, M. Malik, and M. Huber citations: 164
Measurements in two bases are sufficient for certifying high-dimensional entanglement
[Nature Physics](#) **14**, 1032 (2018)
[arXiv:1709.07344 \[quant-ph\]](#) (open access)
- [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 \[cond-mat.mtrl-sci\]](#) (open access)
- [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 \[quant-ph\]](#) (open access)
- [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 \[quant-ph\]](#) (open access)
- [P12] F. Steinlechner, S. Ecker, M. Fink, B. Liu, **J. Bavaresco**, M. Huber, T. Scheidl, and R. Ursin citations: 143
Distribution of high-dimensional entanglement via an intra-city free-space link
[Nature Communications](#) **8**, 15971 (2017) (open access)
[arXiv:1612.00751 \[quant-ph\]](#) (open access)
- [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 \[cond-mat.mtrl-sci\]](#) (open access)

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, currently containing 6 repositories with code pertaining to the research that led to different publications listed above.

Conferences, schools, and academic visits

Organization of International Conferences

- Sep 2018 **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.
Local Organizing Committee

Aug 2015 **V Paraty Quantum Information School and Workshop.** Paraty, Brazil.
Assistant to the Local Organizing Committee

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

Dec 2022 **The University of Tokyo – Group of Prof. Mio Murao.** Tokyo, Japan.
“Resource theory of causal connection”

Nov 2021 **Ulm University – Group of Prof. Martin Plenio.** Ulm, Germany.
“Strict hierarchy between parallel, sequential, and indefinite-causal-order strategies for channel discrimination”

Nov 2021	National University of Singapore (NUS) – Group of Prof. Valerio Scarani. Singapore. <i>“Unitary channel discrimination beyond group structures: Advantages of sequential and indefinite-causal-order strategies”</i>
May 2021	Autonomous University of Barcelona (UAB) – Group of Prof. Andreas Winter. Barcelona, Spain. <i>“Unitary channel discrimination beyond group structures: Advantages of sequential and indefinite-causal-order strategies”</i>
Mar 2021	Chapman University – Group of Prof. Matthew Leifer. Orange, USA. <i>“Strict hierarchy between parallel, sequential, and indefinite-causal-order strategies for channel discrimination”</i>
Jun 2020	S. University of Campinas (UNICAMP) – Group of Prof. Marcelo Terra Cunha. Campinas, Brazil. <i>“Semi-device-independent certification of indefinite causal order”</i>
Oct 2018	University of Vienna — Group of Prof. Anton Zeilinger. Vienna, Austria <i>“Measurements in two basis are sufficient for certifying high-dimensional entanglement”</i>
Apr 2018	University of Nagoya – Group of Prof. Francesco Buscemi. Nagoya, Japan. <i>“Most incompatible measurements for robust steering tests”</i>
Apr 2018	The University of Tokyo – Group of Prof. Mio Murao. Tokyo, Japan. <i>“Semi-device-independent certification of indefinite causal order”</i>
Aug 2017	F. University of Minas Gerais (UFMG) – Group of Prof. Pablo Saldanha. Belo Horizonte, Brazil. <i>“Measurements in two basis are sufficient for certifying high-dimensional entanglement”</i>
Feb 2017	ICFO – Group of Prof. Antonio Acín. Castelldefels (Barcelona), Spain. <i>“Most incompatible measurements for robust steering tests”</i>

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 <i>“What do you mean by random? Randomness, Quantum Mechanics, and Bell Non-locality”</i> . 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: Referee for the journals Physical Review Letters, Physical Review A, New Journal of Physics, Quantum Journal, Quantum Information Processing, European Physics Journal Plus, and the conference TQC 2022.

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

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