Jessica Bavaresco

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Position

Oct 2023 – **SNSF Postdoctoral Fellow** (*Maître Assistante*)
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 – Jun 2021 **PhD in Physics** University of Vienna, Vienna, Austria
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 2019 **Secondment** The University of Tokyo, Tokyo, Japan
Supervisor: Prof. Mio Murao

Aug 2014 – Aug 2016 **Master in Physics** Federal University of Minas Gerais, Belo Horizonte, Brazil
Thesis: *When Bob cannot trust Alice: A semi-device-independent tale of quantum steering*
Supervisor: Prof. Marcelo Terra Cunha

Mar 2010 – July 2014 **Bachelor in Physics** Federal University of Santa Catarina, Florianópolis, Brazil

Jan – Dec 2012 **Bachelor exchange programme** Lafayette College, Easton-PA, USA
Supervisor: Prof. Anthony D. Novaco

Previous positions

Jun 2022 – Sep 2023 **Postdoctoral researcher** – University of Geneva, **Switzerland**
Group leader: Prof. Nicolas Brunner
Funding: NCCR SwissMAP (Switzerland)

Jul 2021 – May 2022 **Postdoctoral researcher** – IQOQI Vienna, ÖAW, **Austria**
Young Independent Research Group (YIRG)
Group leaders: Dr. Ämin Baumeler, Dr. Costantino Budroni, and Dr. Yelena Guryanova
Funding: FWF-Zukunftskolleg (Austria)

Mar – Jun 2019 **Visiting PhD student** – The University of Tokyo, **Japan**
Group leader: Prof. Mio Murao
Funding: FWF-START Prize (Austria)

Oct 2016 – Jun 2021 **Praedoctoral researcher** – IQOQI Vienna, ÖAW, **Austria**
Group leader: Prof. Marcus Huber
Funding: FWF-START Prize (Austria)

Student research

Aug 2014 – Jul 2016 — **CAPES master's research student** – Federal University of Minas Gerais, **Brazil**
Group leader: Prof. Marcelo Terra Cunha
Funding: CAPES Federal Master's research stipend (Brazil)

Aug 2013 – Jul 2014 — **PIBIC undergrad research student** – Federal University of Santa Catarina, **Brazil**
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 – Dec 2011 — **PIBIC undergrad research student** – Federal University of Santa Catarina, **Brazil**
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 $\sim$ 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 $\sim$ 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 $\sim$ 44k EUR
Excelence-based fully funded one-year bachelor schorlarship at Lafayette College, USA.

Memberships in panels or boards

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

Supervision

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

Teaching

Feb – May 2023 **Teaching assistant**, *Méthodes Mathematiques pour Physiciens I* (Mathematical Methods for Physicists I), Bachelor's course, University of Geneva, Switzerland

Sep – Dec 2022 **Teaching assistant**, *Méthodes Mathematiques 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 **540 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: 11
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: 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) (open access)

[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] (open access)

[P6] Y. Chen, S. Ecker, **J. Bavaresco**, T. Scheidl, L. Chen, F. Steinlechner, M. Huber, and R. Ursin — citations: 30
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: 144
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.
"*Unitary channel discrimination beyond group structures: Advantages of sequential and indefinite-causal-order strategies*"

May 2021 **Autonomous University of Barcelona** (UAB) – Group of Prof. Andreas Winter. Barcelona, Spain.
"*Unitary channel discrimination beyond group structures: Advantages of sequential and indefinite-causal-order strategies*"

Mar 2021 **Chapman University** – Group of Prof. Matthew Leifer. Orange, USA.
"*Strict hierarchy between parallel, sequential, and indefinite-causal-order strategies for channel discrimination*"

Jun 2020 **S. University of Campinas** (UNICAMP) – Group of Prof. Marcelo Terra Cunha. Campinas, Brazil.
"*Semi-device-independent certification of indefinite causal order*"

Oct 2018 **University of Vienna** — Group of Prof. Anton Zeilinger. Vienna, Austria
"*Measurements in two basis are sufficient for certifying high-dimensional entanglement*"

Apr 2018 **University of Nagoya** – Group of Prof. Francesco Buscemi. Nagoya, Japan.
"*Most incompatible measurements for robust steering tests*"

Apr 2018 **The University of Tokyo** – Group of Prof. Mio Murao. Tokyo, Japan.
"*Semi-device-independent certification of indefinite causal order*"

Aug 2017 **F. University of Minas Gerais** (UFMG) – Group of Prof. Pablo Saldanha. Belo Horizonte, Brazil.
"*Measurements in two basis are sufficient for certifying high-dimensional entanglement*"

Feb 2017 **ICFO** – Group of Prof. Antonio Acín. Castelldefels (Barcelona), Spain.
"*Most incompatible measurements for robust steering tests*"

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.