Cécilia Lancien

Date of birth: March 3 1990
Nationality: French
Webpage: https://cecilialancien.wixsite.com/mysite
Email: cecilia.lancien@univ-grenoble-alpes.fr

Address: Université Grenoble Alpes
Institut Fourier
100 rue des maths, Bur. 108
38610 Gières, France

SCIENTIFIC ACTIVITIES

From September 2013 to August 2016 I was a PhD student at the Université Claude Bernard Lyon 1 (France) and the Universitat Autònoma de Barcelona (Spain), under the co-advising of Guillaume Aubrun and Andreas Winter. From September 2016 to September 2018 I was a postdoctoral researcher at the Universidad Complutense de Madrid (Spain), under the direction of David Peréz-García. In October 2018 I became Chargée de Recherche CNRS, first at the Institut de Mathématiques de Toulouse (France), until August 2021, and next at the Institut Fourier Grenoble (France).

My main research interests include: quantum information theory, asymptotic geometric analysis (commutative and non-commutative), random matrices and tensors...

Papers and preprints

- C. Lancien, P. Youssef. A note on quantum expanders. *Preprint*.
- K. Fitter, C. Lancien, I. Nechita. Estimating the entanglement of random multipartite quantum states. *Preprint*.
- N. Cheng, C. Lancien, G. Penington, M. Walter, F. Witteveen. Random tensor networks with nontrivial links. *Preprint*.
- M.A. Jivulescu, C. Lancien, I. Nechita. Multipartite entanglement detection via projective tensor norms. *Ann. Henri Poincaré* Vol. 23 No. 11 pp. 3791–3838 (2022).
- C. Lancien. Characterizing expansion, classically and quantumly. *Quantum Views* Vol. 4 No. 44 (2020).
- C. Lancien, C. Majenz. Weak approximate unitary designs and applications to quantum encryption. *Quantum* Vol. 4 No. 313 (2020).
- C. Lancien, D. Pérez García. Correlation length in random MPS and PEPS. *Ann. Henri Poincaré* Vol. 23 No. 1 pp. 141–222 (2022).
- I. Bardet, C. Lancien, I. Nechita. de Finetti reductions for partially exchangeable probability distributions. *Preprint*. Submitted to *Ann. Blaise Pascal*.
- C. Lancien, A. Winter. Approximating quantum channels by completely positive maps with small Kraus rank. *Preprint*. Submitted to *Commun. Math. Phys.*.
- M. Christandl, R. Ferrara, C. Lancien. Random private quantum states. *IEEE Trans. Inf. Th.* Vol. 66 No. 7 pp. 4621–4640 (2020).
- M. Huber, L. Lami, C. Lancien, A. Müller-Hermes. High-dimensional entanglement in states with positive partial transposition. *Phys. Rev. Lett.* Vol. 121 No. 200503 (2018).
- C. González-Guillén, C. Lancien, C. Palazuelos, I. Villanueva. Random quantum correlations are generically non-classical. *Ann. Henri Poincaré* Vol. 18 No. 12 pp. 3793–3813 (2017).
- C. Lancien, A. Winter. Flexible constrained de Finetti reductions and applications. *J. Math. Phys.* Vol. 58 No. 092203 (2017).
- C. Lancien, S. Di Martino, M. Huber, M. Piani, G. Adesso, A. Winter. Should entanglement measures be monogamous or faithful? *Phys. Rev. Lett.* Vol. 117 No. 060501 (2016).
- C. Lancien, A. Winter. Parallel repetition and concentration for (sub-)no-signalling games via a flexible constrained de Finetti reduction. *Chicago Journal of Theoretical Computer Science* Vol. 2016 No. 11 (2016).
- C. Lancien. k-extendibility of high-dimensional bipartite quantum states. *Random Matrices Theory Appl.* Vol. 5 No. 1650011 (2016).
- C. Lancien, O. Gühne, R. Sengupta, M. Huber. Relaxations of separability in multipartite systems: semidefinite programs, witnesses and volumes. *J. Phys. A: Math. Theor.* Vol. 48 No. 505302 (2015).
- G. Aubrun, C. Lancien. Locally restricted measurements on a multipartite quantum system: data hiding is generic. *Quant. Inf. Comput.* Vol. 15 No. 5–6 pp. 512–540 (2014).
- G. Aubrun, C. Lancien. Zonoids and sparsification of quantum measurements. *Positivity* Vol. 20 No. 1 pp. 1–23 (2016).
- C. Lancien, A. Winter. Distinguishing multi-partite states by local measurements. *Commun. Math. Phys.* Vol. 323 No. 2 pp. 555–573 (2013).

Talks

2023
- QuSoft quantum computing seminar (Amsterdam, Netherlands) – May 2023.
- QIQC seminar of the SITP (Stanford, United States) – May 2023.
- Quantum information theory research term (Madrid, Spain) – March 2023.
- Pi day mathematics-physics interface (Paris, France) – March 2023.
- Probability seminar of the ICJ and UMPA (Lyon, France) – March 2023.

2022
- Quantum information workshop (Saarbrücken, Germany) – December 2022.
- Random quantum circuits reading group (Lyon, France) – November 2022.
- Dialogue day with INSMI (Grenoble, France) – November 2022.
- Tensor journal club (Lyon, France) – November 2022.
- Launching day of the QInfo INRIA Team (Lyon, France) – October 2022.
- Autumn school of the GdR MEGA (Aussois, France) – October 2022.
- Start-of-term day of the IF (Grenoble, France) – September 2022.
- AMS-EMS-SMF joint meeting (Grenoble, France) – July 2022.
- Mathematics-Physics interface seminar (Grenoble, France) – June 2022.
- QCM day (Grenoble, France) – May 2022.
- Theory seminar of the LPMMC (Grenoble, France) – May 2022.
- Monthly seminar of the GdR DynQua (Paris, France) – May 2022.
- Stochastic seminar of the NYUAD and SUAD (Abu Dhabi, United Arab Emirates) – April 2022.
- Students' seminar of the ENS UMPA (Lyon, France) – February 2022.
- Students' seminar of the magistère IM^{2}AG (Grenoble, France) – February 2022.
- 2$^{\text{nd}}$ meeting of the ANR project NonStops (Cergy, France) – January 2022.
- Quantum information working group of the LaBRI (Bordeaux, France) – January 2022.

2021
- QuEng quantum computing seminar (Grenoble, France) – October 2021.
- Workshop on geometry and optimization in quantum information (Oberwolfach, Germany) – October 2021.
- Probability seminar of the IF (Grenoble, France) – October 2021.
- Theory day of the CPTGA (Annecy, France) – September 2021.
- Mathematical physics seminar of the IF (Grenoble, France) – September 2021.
- 16$^{\text{th}}$ TQC (Riga, Latvia) – July 2021.
- 3$^{\text{rd}}$ meeting of the Sakura project random matrices and tensors for QI and ML (France–Japan) – July 2021.
- Mathematical physics seminar of the Uniba (Bari, Italy) – June 2021.
- Kick-off meeting of the ANR project QTraj (Toulouse, France) – June 2021.
- 1$^{\text{st}}$ meeting of the Procope project entanglement preservation in QIT (France–Germany) – June 2021.
- Monthly seminar of the GdR MEGA (Paris, France) – June 2021.
- Spring school in theoretical computer science EPIT (Marseille, France) – May 2021.
- Kick-off meeting of the ANR project ESQuisses (Toulouse, France) – April 2021.
- Mathematical quantum physics and algebra seminar of the ITP (Innsbruck, Austria) – March 2021.
- Probability and statistics seminar of the I2M (Marseille, France) – March 2021.
- Quantum information journal club of the IMT and LPT (Toulouse, France) – March 2021.

2020
- Quantum information journal club of the IMT and LPT (Toulouse, France) – November 2020.
- Quantum algebraic security group meeting of the uOttawa (Ottawa, Canada) – November 2020.
- Mathematical physics seminar of the IMT and LPT (Toulouse, France) – June 2020.
- Quantum information seminar of the UCLQ (London, United Kingdom) – June 2020.
- Connes-Kirchberg-Tsireslon working group of the UMPA, LIP and ICJ (Lyon, France) – April 2020.

2019
- Quantum information meeting (Lyon, France) – December 2019.
- Modelling working group of the LPSM (Paris, France) – November 2019.
- LPT-IMT day (Toulouse, France) – September 2019.
- 14$^{\text{th}}$ QMath, Quantum information session (Aarhus, Denmark) – August 2019.
- Random tensors working group of the IMT (Toulouse, France) – July 2019.
- Conference on geometric and functional inequalities in convexity and probability (Firenze, Italy) – May 2019.
- Monthly seminar of the GdR MEGA (Paris, France) – March 2019.
- Quantum information seminar of the mathQI (Madrid, Spain) – February 2019.
- Random tensors working group of the IMT (Toulouse, France) – January 2019.

2018

- Functional analysis seminar of the IMT (Toulouse, France) – December 2018.
- Workshop on projected entangled pair states and topological matter (Toulouse, France) – December 2018.
- Workshop on random quantum circuits of the ANR project StoQ (Toulouse, France) – November 2018.
- Theoretical physics seminar of the LPTM (Cergy, France) – October 2018.
- 19$^{\text{th}}$ ICMP, Quantum information session (Montréal, Canada) – July 2018.
- Workshop on interactions between operator space theory and quantum probability with applications to quantum information (Oberwolfach, Germany) – May 2018.

2017
- Quantum information seminar of the mathQI (Madrid, Spain) – December 2017.
- Workshop Quantum innovators in computer science and mathematics (Waterloo, Canada) – September 2017.
- Analysis seminar of the IMJ-PRG (Paris, France) – April 2017.
- Quantum information seminar of the QCI (Bristol, United-Kingdom) – March 2017.
- Quantum information seminar of the mathQI (Madrid, Spain) – March 2017.
- Theoretical physics seminar of the SITP (Stanford, United States) – January 2017.

2016
- Analysis seminar of the LPP (Lille, France) – December 2016.
- Quantum information seminar of the CQIF (Cambridge, United-Kingdom) – November 2016.
- Annual meeting of the GDR AFHP (Toulouse, France) – October 2016.
- Probability seminar of the IMT (Toulouse, France) – October 2016.
- 11$^{\text{th}}$ TQC (Berlin, Germany) – September 2016.
- Conference on quantum information theory and mathematical physics (Budapest, Hungary) – September 2016.
- Workshop on QMA(2) and the complexity of entanglement (College Park, United States) – August 2016.
- Summer school on stochastic methods in quantum mechanics (Autrans, France) – July 2016.
- Doctoral students' seminar of the ICJ and the UMPA (Lyon, France) – May 2016.
- Information and complexity seminar of the ICJ and the LIP (Lyon, France) – May 2016.
- Quantum information seminar of the mathQI (Madrid, Spain) – April 2016.
- Workshop on convexity of the ANR project StoQ (Villard-Reculas, France) – March 2016.
- Quantum information seminar of the GIQ (Barcelona, Spain) - February 2016.
- Workshop on linear matrix inequalities, semidefinite programming and quantum information theory (Toulouse, France) – January 2016.

2015
- ICMA, Workshop on mathematical methods in quantum information theory (Timisoara, Romania) – November 2015.
- 3$^{\text{rd}}$ Meeting of the ANR project OSQPI (Paris, France) – October 2015.
- 9$^{\text{th}}$ Workshop Young researchers in mathematics (Madrid, Spain) – September 2015.
- Workshop on quantum thermodynamics and information (Toulouse, France) – September 2015.
- Joint BMC & BAMC, Workshop on quantum information theory (Cambridge, United Kingdom) – March 2015.

2014
- Conference on operator spaces and quantum probability (Besançon, France) – December 2014.
- Quantum information seminar of the M5 (Munich, Germany) – November 2014.
- 1$^{\text{st}}$ Meeting of the ANR project StoQ (Lyon, France) – November 2014.
- 10$^{\text{th}}$ MAS days, Session on random matrix theory (Toulouse, France) – August 2014.

2013
- Conference nic@qs (Erice, Italy) – October 2013.
- Intensive month on operator algebras and quantum information (Madrid, Spain) – June 2013.

2012
- 1$^{\text{st}}$ Meeting of the ANR project OSQPI (Lyon, France) – October 2012.
- 12$^{\text{th}}$ AQIS (Suzhou, China) – August 2012.

Posters

- 25$^{\text{th}}$ QIP (Pasadena, United States) – March 2022.
- 21$^{\text{st}}$ QIP (Delft, Netherlands) – January 2018.
- Quantum information theory conference (Paris, France) – December 2017.
- 20$^{\text{th}}$ QIP (Seattle, United States) – January 2017.
- 11$^{\text{th}}$ TQC (Berlin, Germany) – September 2016.
- 4$^{\text{th}}$ BIID (Barcelona, Spain) – July 2016.
- 3$^{\text{rd}}$ Quantum information workshop (Seefeld, Austria) – June 2016.
- 19$^{\text{th}}$ QIP (Banff, Canada) – January 2016.

- QMath masterclass (Copenhagen, Denmark) – May 2015.
- 18ᵗʰ QIP (Sydney, Australia) – January 2015.
- 2ⁿᵈ Quantum information workshop (Seefeld, Austria) – June 2014.
- 17ᵗʰ QIP (Barcelona, Spain) – February 2014.

Meta-scientific activities

Grants and projects

- Steering committee member of the research federation "QuantAlps", in charge of the research axis "Quantum information & software": interdisciplinary network involving 200 researchers from 18 labs around Grenoble.
- Member of a Projet de recherche collaborative on "Stochastic quantum evolutions": 4-year grant involving 11 people delivered by the French ANR to develop an ambitious research theme (352000€, January 2021 – December 2024).
- Member of a Projet générique on "Quantum trajectories": 4-year grant involving 9 people delivered by the French ANR to develop an ambitious research theme (195900€, January 2021 – December 2024).
- Member of a Projet générique on "Space of traffics and asymptotics of random spectra": 4-year grant involving 10 people, delivered by the French ANR to develop an ambitious research theme (180600€, January 2021 – December 2024).
- Holder of an Investissement d'avenir on "Random tensors and related topics": 2-year grant involving 4 people, delivered by the French ANR through the LabEx CIMI to develop an interdisciplinary research project (17500€, October 2020 – December 2022).
- Member of a Sakura partnership on "Random matrices and tensors for quantum information and machine learning": 2-year grant involving 12 people delivered jointly by France and Japan to fund research travels between both countries (12000€/year, February 2020 – December 2021).
- Holder of a Projet exploratoire de premier soutien (PEPS) on "Random tensors and quantum information theory": individual 1-year grant delivered by the French CNRS to young researchers to help them develop their research (3500€, February 2019 – December 2019).
- Holder of a Prime d'encadrement doctoral et de recherche (PEDR): individual 4-year bonus given by the French CNRS for exceptional contribution to research (3500€/year, November 2018 – November 2022).

Reviewing

- Reviewing for the journals *J. Funct. Anal.*, *Commun. Math. Phys.*, *Ann. Henri Poincaré*, *Canad. J. Math.*, *Random Matrices: Theory Appl.*, *Quant. Inf. Comput.*, *Int. Math. Res. Not.*, *J. Phys. Commun.*, *Quantum*, *J. Phys. A*, *Compositionality* and *IEEE Trans. Inf. Th.*.
- Reviewing for the conferences QIP, TQC, FOCS, ISIT, BIID.
- Reviewing for the MathSciNet reviews.
- Program committee co-chair for the conference BIID 2023. Program committee member for the conferences Q-Turn 2018 and 2020, QIP 2019 and 2022, TQC 2020 and 2023, QML@ECMLPKDD 2022.

Evaluation

- PhD reviewer for the theses of L. Leepäjärvi (University of Turku, Finland), A. Kubicki (Universitat de València, Spain) and A. Ruiz de Alarcón Torregrosa (Universidad Complutense de Madrid, Spain). PhD committee member for the theses of T. Goubault de Brugière (Université Paris-Saclay, France), A. Amr Rey (Universidad Complutense de Madrid, Spain), A. Goswami (Université Grenoble Alpes, France), F. Loulidi (Université Paul Sabatier Toulouse, France) and A. Oufkir (ENS Lyon, France).
- Selection committee member for assistant professor positions at DTU Compute (Copenhagen, Denmark), IF (Grenoble, France), LaBRI (Bordeaux, France) and LKJ (Grenoble, France).

Organization of events

- Co-organization of the mathematical physics seminar (October 2018 – August 2021) and the probability seminar (September 2019 – August 2021) of the Institut de Mathématiques de Toulouse.
- Co-organization of the thematic program "Random tensors" at the Institut Henri Poincaré (Paris, France) – October 2024.
- Co-organization of the CIRM conference "Random tensors and related topics" (Marseille, France) – March 2022.
- Co-organization of the BIRS Workshop "Probability and quantum information science" (Banff, Canada) – March 2022.
- Co-organization of the fall school of the ANR project QTraj (Toulouse, France) – October 2021.
- Co-organization of the thematic program "Operator algebras, groups and applications to quantum information" at the

Instituto de Ciencias Matemáticas (Madrid, Spain) – Spring 2019.
• Co-organization of the workshop "Projected entangled pair states and topological matter" (Toulouse, France) – December 2018.
• Co-organization of the conference "Probabilistic techniques and quantum information theory" inside the thematic program "Analysis in quantum information theory" at the Institut Henri Poincaré (Paris, France) – October 2017.
• Organization of the internal workshop "Convexity" of the ANR project StoQ (Villard-Reculas, France) – March 2016.

Other profesionnal activities

• September 2014 - July 2016 : Exercise classes and oral examinations in mathematics for undergraduate students at the Université Claude Bernard Lyon 1, France.
• September 2013 - July 2014 : Lectures and exercise classes in mathematics for undergraduate students at the Institut Universitaire de Technologie GTE Bourg-en-Bresse, France.
• September 2012 - July 2013 : Tutoring and exercise classes in mathematics for undergraduate students at the École Polytechnique Paris-Saclay, France.
• July 2011 - August 2011 : Computer programming on a public health study at the Centre de Recerca en Epidemiologia Ambiental Barcelona, Spain.
• October 2009 - April 2010 : Science teaching in kindergarten, primary school and junior high-school for the organization La Main à la Pâte Puy-de-Dôme, France.

Post High-school path

Education

• September 2013 - August 2016 : PhD at the Université Claude Bernard Lyon 1, France and the Universitat Autònoma de Barcelona, Spain.
PhD thesis: "High dimension and symmetries in quantum information theory", under the co-advising of G. Aubrun and A. Winter.
• September 2009 - August 2013 : École Polytechnique Paris-Saclay, France.
  ∗ **4$^{\text{th}}$ academic year :** Specialized Master Degree in Fundamental Mathematics at the Université Pierre et Marie Curie Paris 6, France.
Research Project (5 months): "Distinguishability of quantum states on high-dimensional multi-partite systems", Université Claude Bernard Lyon 1, under the supervision of G. Aubrun.
  ∗ **3$^{\text{rd}}$ academic year :** Specialized mathematics and theoretical physics courses.
Scientific projects: "Symmetry groups in physics", under the supervision of D. Bernard and D. Renard - "General relativity", under the supervision of J-P. Bourguignon and D. Langlois.
Research Project (3 months): "Distinguishing multi-partite quantum states by local measurements", University of Bristol, under the supervision of A. Winter.
  ∗ **2$^{\text{nd}}$ academic year :** General scientific courses.
Scientific projects: "Study of Bose-Einstein condensates", under the supervision of F. Chevy - "Kleinien groups and appolonien packing", under the supervision of R. Dujardin.
  ∗ **1$^{\text{st}}$ academic year :** General scientific courses.
• September 2007 - July 2009 : Classes préparatoires aux Grandes Écoles Scientifiques at Victor Hugo High-school Besançon, France (Mathematics-Physics category, Computer science option).

Diploma

• June 2016 : PhD in Mathematics from the Université Claude Bernard Lyon 1, France and in Physics from the Universitat Autònoma de Barcelona, Spain.
• September 2013 : Master Degree in Fundamental Mathematics from the Université Pierre et Marie Curie Paris 6, France (average grade : 17,45/20).
• September 2012 : Engineer diploma and General Master Degree in Science from the École Polytechnique Paris-Saclay, France (average grade : A, rank : 23/414).
• June 2007 : French national General Scientific Baccalauréat passed with highest honors and European English distinction (average grade : 20/20).

Miscellaneous

Honors and awards

• Was selected to participate to the Heidelberg Laureate Forum, putting together 200 international young researchers and winners of Fields Medal and Turing Award (2013).
• Was awarded a prize for the best research project by the École Polytechnique (2012).
• Took part in the French national "Concours Général" in Mathematics (2007), Physics (2007) and Literature (2006).

Language skills

French : native language – **English, Italian and Spanish :** fluent – **German :** intermediate.

Computer skills

Programming / Numerical calculus : Java, Caml, Sage, GAP, Scilab, Maple, Freefem++, R.