

Lorenzo Catani

Curriculum vitae

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Personal information

Place and Date of birth Jesi, 23rd April 1990 Nationality Italian

Education and training

- 2018- **Post-doctoral Researcher**, *Chapman University*, Schmid College of Science and Technology, Prof Matthew Leifer and Prof Justin Dressel's research groups.
- 2015-2018 **PhD Theoretical Physics - Quantum information**, *University College London*, Department of Physics and Astronomy, Supervisor: Prof Dan Browne, Examiners: Prof Jonathan Barrett and Dr Luis Masanes.
From the 15th of May 2017 to the 8th of August 2017 I was a visitor at the University of British Columbia (Prof. R. Raussendorf's group) - Vancouver, Institute of quantum Computing (Prof. J. Emerson's group) and Perimeter Institute (Prof R. Spekkens' group) - Waterloo.
- 2014-2015 **MRes Delivering Quantum Technologies**, *University College London*, Department of Physics and Astronomy, Pass with Distinction.
In 2014 I won a place in the Centre for doctoral training - delivering quantum technologies - that consists of a four years programme: one year of MRes and three years of standard PhD (for more details see www.uclq.org/centre-for-doctoral-training).
- 2012-2014 **MSc Theoretical Physics**, *Alma Mater Studiorum*, Università di Bologna, grade 110/110 cum laude.
I mostly worked for my thesis in London (six months) at Imperial College London. Supervisor: Prof. Terence Rudolph (Imperial College London) and Prof.ssa Elisa Ercolessi (University of Bologna).
- 2012-2014 **Collegio Superiore**, *Alma Mater Studiorum*, Università di Bologna.
The Collegio Superiore is a higher education institution in Bologna, being part of the process of Superior Graduate Schools in Italy. It belongs to the University of Bologna, and its principal aim is to allow selected and highly motivated students to live together and to attend, besides traditional university courses, seminars and lectures held both by Italian and foreign professors and researchers (for more details see www.collegio.unibo.it).
- 2009-2012 **BSc Physics**, *Alma Mater Studiorum*, Università di Bologna, grade 110/110 cum laude.
- 2004-2009 **Maturità scientifica**, *Liceo Scientifico "Leonardo Da Vinci"*, Jesi, grade 100/100.

Languages

Italiano Excellent *Mother tongue*
English Fluent *I have been living in english speaking countries since February 2014.*

IT skills

Operating system	Mac, Unix/Linux, Windows	Programming language	Python, C++
Programs	Microsoft Office	Software program	Mathematica, Matlab, Labview
Typography	LaTeX		

Workshops/conferences

- 29/06/14 - 2/07/14 Quantum Roundabout, University of Nottingham. Contributed talk.
- 9-10/02/16 *Physics Hackaton*, UCL, London(UK). Competition group winner.
- 12-19/03/16 *Rethinking foundation* - Dorfgastein, Austria. Contributed talk.
- 1-3/06/16 *QCumber* - Cumberland lodge, Windsor(UK). Contributed talk.
- 21-23/06/16 *Contextuality as a resource in quantum computation* - UCL, London(UK). Attended.
- 7-13/07/16 *E. Fermi summer school on foundation of physics* - Lake Como, Italy. Poster award won.
- 19-21/10/16 *YQIS* - Barcelona, Spain. Poster presented.
- 22-26/05/17 *Algebraic Structures in quantum computation* - UBC, Vancouver(Canada). Contributed talk.
- 24-28/07/17 *Contextuality: Conceptual Issues, Operational Signatures, and Application* - Perimeter Institute, Waterloo, Canada. Poster presented.
- 26-28/10/17 *EmQm17: 4th International Symposium about Quantum Mechanics based on a Deeper Level Theory* - University of London, London(UK). Poster presented.
- 11-12/12/17 *Foundations of quantum mechanics and their impact on contemporary society* - The Royal Society, London(UK). Poster presented.
- 14-15/12/17 *Revising Foundations of Physics Workshop* - UCL, London(UK). Contributed talk.
- 12-19/01/18 *QIP* - Delft, Netherlands. Poster presented.
- 24-25/03/18 *Current Problems in Theoretical Physics: Information geometry and quantum information* - Vietri sul mare, Italy. Invited talk.
- 27/04/18 *Contextuality and Special Topics in Quantum Foundations* - University of Notre Dame - London (UK). Attended.
- 15-27/05/18 *Algebraic Structures in quantum computation* - UBC, Vancouver (Canada). Invited talk.
- 26-30/11/18 *QTurn* - Universidade Federal de Santa Catarina, Florianopolis (Brazil). Poster presented.
- 4-8/03/19 *March meeting* - Boston Convention and Exhibition Center, Boston(USA). Attended.
- 9-10/03/19 *Encapsulated Agents in Quantum Theory: Re-examining Wigner's Friend* - UMass, Boston(USA). Attended.
- 18-22/03/19 *PiMan - Workshop Perimeter Institute/Chapman University* - Chapman University, Orange, California(USA). Contributed talk.

- 10-14/06/19 *Quantum physics and logic* - Chapman University, Orange, California(USA). Contributed talk.
- 17-21/06/19 *Solstice of foundations* - ETH, Zurich (Switzerland). Poster presented.
- 4-6/07/19 *Contextuality as a resource in quantum computation* - University of Oxford, Oxford(UK). Invited talk.
- 10-14/07/19 *Quantum causal structures* - University of Oxford, Oxford(UK). Attended.
- 25-29/11/19 *Quantum Correlations, Contextuality and All That Again³* - Federal University of Rio Grande do Norte, Natal (Brazil). Contributed talk.
- 01-05/06/20 *Quantum physics and logic* - online conference due to the pandemic. Contributed talk.

Teaching Experiences

- 1-30/11/16 I taught the tutorial lectures of the course of *Mathematical Methods III* to Physics undergraduate students.
- 1-9/01/17 I marked the problem sheets for the course of *Dynamical Systems*.
- 13-20/03/17 I marked the exams of the course of *Thermal Physics*.
- 21-30/03/17 I taught the tutorial sessions of the *Quantum Error Correction* course to CDT students doing their MRes year. I have also marked their problem sheets.
- 22/09/17 I attended the UCL ARENA ONE course at UCL to improve my teaching skills.
- 16/10 - I taught the tutorial lectures for the course of *Classical Mechanics* to undergraduate
15/12/17 students.
- 31/10/17- I marked the problem sheets for the course of *Advanced Quantum Mechanics*.
31/01/18

Awards

- 1/06/12 Certificate of merit from the Dean of University of Bologna, Prof. Ivano Dionigi, as one of the best students in the University.
- 9-10/02/16 Competition group winner at the Physics Hackaton, UCL, London.
- 7-13/07/16 Poster prize at the E. Fermi summer school on foundation of physics. Over 60 participants to the poster competition.

Other Experiences

- 18/01/2014 I gave a talk at the University of Bologna on Bose-Einstein condensates and non-interacting Fermi gas to the Many-body physics group.

- 10/2015 - I am the founder, together with other three colleagues, of the *Quantum information and foundations reading group* at UCL. This is a student-led/based society with the purpose to organize informal meetings to present and discuss relevant papers about quantum information and foundations that we are passionate about, but that are slightly beyond our narrow research area. This keeps us up to date with the wider research context within which we operate. The meetings are usually structured either as a standard talk or as an informal discussion about a paper read by the participants beforehand. Sometimes we invite external speakers from other nearby universities to speak. The meetings are held two times per month on average.
- 4/04/2017 I was in the organizing committee for the QUBIT workshop at UCL, held to bring together the students from the CDTs in quantum information of UCL, Imperial College and University of Bristol.
- 01/03/2017 I advised a CDT student for his case study research on contextuality and applications in quantum computation.
- 10/04/2017 I gave a lecture (called *alumni lecture*), organized by the Collegio Superiore, open to all students of the University of Bologna on the philosophical consequences of quantum mechanics.
- 4/07/2017 I gave a talk at Perimeter Institute, Waterloo (Canada) about my paper *New J. Phys.* **19** 073035 (2017), video available at http://pirsa.org/index.php?p=speaker&name=Lorenzo_Catani.
- 10-22/03/18 I spent about two weeks as a visitor at Chapman University in Prof. Matt Leifer's group, Orange (California). I gave a talk there on my project concerning Tsirelson's bounds and Landauer's principle.
- 2019 I was a local organizer of the Quantum Physics and Logic conference at Chapman University, 10-14/06/2019.
- 2/07/19 I visited and gave a talk at UCL, London (UK) about my paper *Phys. Rev. A* **98**, 060302 (2018).
- 03-21/09/19 I visited Perimeter Institute, Waterloo (Canada) - Prof Robert Spekkens' group.
- 13/09/19 I gave a talk at Perimeter Institute, Waterloo (Canada) about my paper [arXiv:2003.10050](https://arxiv.org/abs/2003.10050), video available at <http://pirsa.org/19090093/>.
- 17/04/20 I gave an online talk at UCL, London (UK) about my paper [arXiv:2003.10050](https://arxiv.org/abs/2003.10050).
- 03/2016 - I am a member of the Basic Research Community for Physics (BRCP), <https://www.basic-research.org>.
- 01/2019 - I have been organizing the quantum group meetings at Chapman University. I have also contributed with talks on my research and lectures on Frauchiger-Renner theorem and on general probabilistic theories.
- 02/20 - I have been supervising a PhD student, Giovanni Scala, visiting Chapman from the University of Bari on a project relating contextuality and wave/particle duality.

Publications

- *Spekkens toy model and its relationship with stabilizer quantum mechanics in odd dimensions*, L. Catani and D. E. Browne, *New J. Phys.* **19** 073035 (2017).

- *State-injection schemes of quantum computation in Spekkens' toy theory*, L. Catani and D. E. Browne, Phys. Rev. A **98** 052108 (2018).
- *Tsirelson's bound and Landauer's principle in a single-system game*, L. Henaut, L. Catani, D.E. Browne, S. Mansfield and A. Pappa, Phys. Rev. A **98**, 060302 (2018).
- *Spekkens' toy model and contextuality as a resource in quantum computation*, L. Catani, D.E. Browne and N. De Silva, Proceedings of the International School of Physics" Enrico Fermi" **197**, 301-308, IOS Press (2019).
- *A mathematical framework for operational fine tunings*, L. Catani and M. Leifer, arXiv:2003.10050 (2020).
- *Relationship between classical features of quantum transformations*, L. Catani, arXiv:2004.06318 (2020).