

# Felix Leditzky

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Nationality Austrian

## Employment

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Nov 2016 – present Postdoctoral Research Associate, JILA, University of Colorado Boulder  
Advised by Graeme Smith

## Education

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Oct 2013 – Oct 2016 PhD, University of Cambridge  
Supervised by Nilanjana Datta  
Thesis: “Relative entropies and their use in quantum information theory”  
(available online at [arXiv:1611.08802](https://arxiv.org/abs/1611.08802))

Oct 2006 – Apr 2013 Diploma in Physics (Mag. rer. nat.), University of Vienna  
Supervised by Harald Grosse (graduated with distinction)  
Thesis: “Deformed  $\mathbb{R}^3$  as a physical framework for quantum mechanical problems”  
(available online at <http://othes.univie.ac.at/26831/>)

Oct 2006 – Feb 2012 Diploma in Mathematics (Mag. rer. nat.), University of Vienna  
Supervised by Joachim Mahnkopf (graduated with distinction)  
Thesis: “Principal indecomposable modules for the Alternating group on five symbols in modular characteristic”  
(available online at <http://othes.univie.ac.at/19235/>)

## Extended research visits

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Mar 2019 Kavli Institute for Theoretical Physics, Santa Barbara, CA, USA  
Program “[Machine Learning for Quantum Many-Body Physics](#)”  
Dec 2017 Kavli Institute for Theoretical Physics, Santa Barbara, CA, USA  
Program “[Quantum Physics of Information](#)”  
Sep 2017 Institute Henri Poincaré, Paris, France  
Program “[Analysis in Quantum Information Theory](#)”

## Publications & preprints

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- [12] Christandl, M., F. Leditzky, C. Majenz, G. Smith, F. Speelman, and M. Walter. “Asymptotic performance of port-based teleportation”. *arXiv preprint* (2018). arXiv: [1809.10751](https://arxiv.org/abs/1809.10751) [[quant-ph](#)]  
[11] Bausch, J. and F. Leditzky. “Quantum Codes from Neural Networks”. *arXiv preprint* (2018). arXiv: [1806.08781](https://arxiv.org/abs/1806.08781) [[quant-ph](#)]

- [10] Leditzky, F., D. Leung, and G. Smith. “Dephasure Channel and Superadditivity of Coherent Information”. *Physical Review Letters* 121.16 (2018), p. 160501. arXiv: [1806.08327 \[quant-ph\]](#)
- [9] Leditzky, F., N. Datta, and G. Smith. “Useful states and entanglement distillation”. *IEEE Transactions on Information Theory* 64.7 (2018), pp. 4689–4708. arXiv: [1701.03081 \[quant-ph\]](#)
- [8] Leditzky, F., D. Leung, and G. Smith. “Quantum and Private Capacities of Low-Noise Channels”. *Physical Review Letters* 120.16 (2018), p. 160503. arXiv: [1705.04335 \[quant-ph\]](#)
- [7] Leditzky, F., E. Kaur, N. Datta, and M. M. Wilde. “Approaches for approximate additivity of the Holevo information of quantum channels”. *Physical Review A* 97.1 (2018), p. 012332. arXiv: [1709.01111 \[quant-ph\]](#)
- [6] Leditzky, F., C. Rouzé, and N. Datta. “Data processing for the sandwiched Rényi divergence: a condition for equality”. *Letters in Mathematical Physics* 107.1 (2017), pp. 61–80. arXiv: [1604.02119 \[quant-ph\]](#)
- [5] Beigi, S., N. Datta, and F. Leditzky. “Decoding Quantum Information via the Petz recovery map”. *Journal of Mathematical Physics* 57.8, 082203 (2016). arXiv: [1504.04449 \[quant-ph\]](#)
- [4] Leditzky, F., M. M. Wilde, and N. Datta. “Strong converse theorems using Rényi entropies”. *Journal of Mathematical Physics* 57.8, 082202 (2016). arXiv: [1506.02635 \[quant-ph\]](#)
- [3] Leditzky, F. and N. Datta. “Second order asymptotics of visible mixed quantum source coding via universal codes”. *IEEE Transactions on Information Theory* 62.7 (2016), pp. 4347–4355. arXiv: [1407.6616 \[quant-ph\]](#)
- [2a] Datta, N. and F. Leditzky. “Second-Order Asymptotics for Source Coding, Dense Coding, and Pure-State Entanglement Conversions”. *IEEE Transactions on Information Theory* 61.1 (2015), pp. 582–608. arXiv: [1403.2543 \[quant-ph\]](#)
- [2b] Datta, N. and F. Leditzky. “Corrections to “Second-Order Asymptotics for Source Coding, Dense Coding, and Pure-State Entanglement Conversions””. *IEEE Transactions on Information Theory* 64.4 (2017), pp. 2625–2627
- [1] Datta, N. and F. Leditzky. “A limit of the quantum Rényi divergence”. *Journal of Physics A: Mathematical and Theoretical* 47.4 (2014), p. 045304. arXiv: [1308.5961 \[quant-ph\]](#)

## Grants, Awards & Scholarships

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| Aug 2018            | National Science Foundation Grant <a href="#">CCF 1834515</a> (Principal Investigator)<br>Covering travel support for workshop <i>Rocky Mountain Summit on Quantum Information</i> in the amount of \$10,000.00. |
| Oct 2013 – Sep 2016 | Maintenance grant, Department of Pure Mathematics and Mathematical Statistics, University of Cambridge   |
| Apr 2015            | EPSRC grant covering College and University fees<br>Smith-Knight and Rayleigh-Knight Prize<br>Essay title: “Source coding for a mixed source: determination of second order asymptotics”                         |
| Jan 2009            | Performance scholarship, University of Vienna  |
| Jan 2008            | Performance scholarship, University of Vienna  |

## Presentations

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### Colloquium talks

- Apr 2018 *IQC Colloquium talk*, IQC, University of Waterloo, Canada  
Title: “Asymptotic performance of port-based teleportation”

### Contributed talks

- Feb 2019 *Southwest Quantum Information and Technology*, Albuquerque, USA  
Title: “Dephasure channel and superadditivity of coherent information”

- Jan 2019\* *Quantum Information Processing*, Boulder, USA  
Title: “Asymptotic performance of port-based teleportation”
- Jul 2018 *Beyond I.I.D. in Information Theory*, Cambridge, UK  
Title: “Dephasure channel and superadditivity of coherent information”
- Jul 2017 *Beyond I.I.D. in Information Theory*, Singapore, Singapore  
Title: “Useful states and entanglement distillation”
- Jun 2017 *IEEE International Symposium on Information Theory*, Aachen, Germany  
Title: “Degradable states and one-way entanglement distillation”
- Jul 2016 *IEEE International Symposium on Information Theory*, Barcelona, Spain  
Title: “Strong converse theorem for state redistribution using Rényi entropies”
- Sep 2015 *Quantum Information Processing and Communication*, Leeds, UK  
Title: “Second Order Asymptotics of Quantum Mixed Source Coding”

\* indicates delivery by co-author.

### Invited talks

- Oct 2018 *Quantum Innovators in computer science and mathematics*, IQC, University of Waterloo, Canada  
Title: “Quantum Codes from Neural Networks”
- Nov 2017 *IEEE Information Theory Workshop*, Kaohsiung, Taiwan  
Title: “Quantum and private capacities of low-noise channels”
- Aug 2015 *Young Researchers in Mathematics*, University of Oxford, UK  
Title: “Second Order Asymptotics in Quantum Information Theory: Quantum Source Coding”
- Jul 2015 *Beyond I.I.D. in Information Theory*, Banff, Canada  
Title: “Strong converse theorems using Rényi entropies”
- Aug 2014 *QUTE-Europe Summer School*, Smolenice, Slovakia  
Title: “Source coding for a mixed source: determination of second order asymptotics”

### Poster presentations

- Feb 2019 *Southwest Quantum Information and Technology*, Albuquerque, USA  
Title: “Quantum codes from neural networks”
- Jan 2019 *Quantum Information Processing*, Boulder, USA  
Title: “Quantum codes from neural networks”
- Jul 2018 *Beyond I.I.D. in Information Theory*, Cambridge, UK  
Title: “Port-based teleportation in arbitrary dimension – asymptotics and a converse bound”
- Jan 2018 *Quantum Information Processing*, Delft, Netherlands  
Title: “Bounds on quantum channel capacities from approximate additivity of channel information quantities”  
Title: “Quantum and private capacities of low-noise channels”
- Jan 2017 *Quantum Information Processing*, Seattle, USA  
Title: “Degradable states and one-way entanglement distillation”
- Jul 2016 *Beyond I.I.D. in Information Theory*, Barcelona, Spain  
Title: “Degradable states: Upper bounds on one-way distillable entanglement and quantum capacity”
- Jan 2016 *Quantum Information Processing*, Banff, Canada  
Title: “Strong converse theorems using Rényi entropies”
- Feb 2014 *Quantum Information Processing*, Barcelona, Spain  
Title: “A limit of the quantum Rényi divergence”

## Seminar talks

- Mar 2019 *Machine Learning for Quantum Many-Body Physics*, KITP, University of California Santa Barbara, USA  
Title: “Quantum codes from neural networks”
- Nov 2018 *CQIF group seminar*, University of Cambridge, UK  
Title: “Asymptotic performance of port-based teleportation”
- Sep 2018 *IQOQI Seminar*, Austrian Academy of Sciences & University of Vienna, Austria  
Title: “Dephasure channel and superadditivity of coherent information”
- Jun 2018 *Stanford University Seminar*, Stanford University, USA  
Title: “Dephasure channel and superadditivity of coherent information”
- May 2018 *MIT Seminar*, Massachusetts Institute of Technology, USA  
Title: “Asymptotic performance of port-based teleportation”
- May 2018 *PI Seminar*, Perimeter Institute for Theoretical Physics, Canada  
Title: “Asymptotic performance of port-based teleportation”
- Jan 2018 *QuSoft Seminar*, QuSoft, University of Amsterdam, Netherlands  
Title: “Useful states and entanglement distillation, and a toy channel exhibiting superadditivity of coherent information”
- Nov 2017 *Hunter College group seminar*, City University of New York, USA  
Title: “Bounds on quantum channel capacities from approximate additivity of channel information quantities”
- Sep 2017 *Analysis in Quantum Information Theory: Junior research seminar*, IHP, Paris, France  
Title: “Bounds on quantum channel capacities from approximate additivity of channel information quantities”
- Jul 2017 *IQI Seminar*, Caltech, USA  
Title: “Useful states and entanglement distillation”
- May 2017 *LSU group seminar*, Louisiana State University, USA  
Title: “On the quantum capacity of the qubit depolarizing channel”
- May 2017 *LSU group seminar*, Louisiana State University, USA  
Title: “Relative entropies and their use in quantum information theory”
- Apr 2017 *CTQM seminar*, University of Colorado Boulder, USA  
Title: “Upper bounds on the one-way and two-way distillable entanglement from suitable convex decompositions”
- Apr 2017 *CQIF group seminar*, University of Cambridge, UK  
Title: “On the quantum capacity of the qubit depolarizing channel”
- Feb 2016 *CAKE seminar*, University of Cambridge, UK  
Title: “Equality condition in the data processing inequality for the quantum relative entropy”
- Jan 2016 IBM Thomas J. Watson Research Center, Yorktown Heights, USA  
Title: “Strong converse theorems using Rényi entropies”

## Academic service

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- Jan 2018 – Jan 2019 Organizer of the conference *Quantum Information Processing (QIP) 2019* held at University of Colorado Boulder, USA, January 14-18, 2019.  
Co-organizer: Graeme Smith.  
Website: <http://jila.colorado.edu/qip2019>
- Nov 2017 – Jun 2018 Organizer of the workshop *Rocky Mountain Summit on Quantum Information* held at JILA, University of Colorado Boulder, USA, June 25-29, 2019.  
Co-organizers: Graeme Smith, Mark M. Wilde.  
Website: <http://jila.colorado.edu/rmsqi>
- April 2018 Member of program committee for conference *CEQIP 2018*.

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| Oct 2013 – present  | Website: <a href="http://ceqip.eu/2018/index.php">http://ceqip.eu/2018/index.php</a><br>Reviewing for: <i>IEEE Transactions on Information Theory</i> , <i>Physical Review Letters</i> , <i>Physical Review A</i> , <i>Communications in Mathematical Physics</i> , <i>Journal of Mathematical Physics</i> , <i>Quantum Information Processing</i> , <i>npj Quantum Information</i> , <i>Quantum</i> , various conferences ( <i>ISIT</i> , <i>ITW</i> , <i>QIP</i> , <i>TQC</i> , <i>AQIS</i> , <i>CEQIP</i> ) |
| Oct 2014 – Jun 2015 | Vice-President of the post-graduate community (MCR) of Girton College, University of Cambridge   |
| Oct 2013 – Jun 2014 | Social Secretary of the post-graduate community (MCR) of Girton College, University of Cambridge   |

## Teaching experience

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| Oct – Dec 2015 | Example classes on Quantum Information Theory (graduate level course, lectured by William Matthews) |
| Oct – Dec 2014 | Example classes on Quantum Information Theory (graduate level course, lectured by William Matthews) |
| Oct – Dec 2013 | Example classes on Quantum Information Theory (graduate level course, lectured by Nilanjana Datta)  |

## Research interests

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Quantum information theory, in particular:  
 additivity questions in quantum information theory, quantum channels and their capacities, multipartite entanglement, neural networks and tensor networks ansätze for many-body quantum states, symmetries and representation theory, quantum Shannon theory, mathematics of relative entropies, semidefinite programming, strong converse theorems, second order asymptotics, global optimization techniques

## Language & IT skills

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| Languages | German (native), English (fluent), Spanish (conversational), Latin (translation) |
| IT        | Matlab, Mathematica, Python, HTML, CSS, Linux, $\LaTeX$ , Office applications    |

## Interests

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Music, playing guitar, reading, playing football, running, traveling