

## Curriculum Vitae - Patrick Rall

Full name: **Patrick Julian Tassilo Rall**      **Email:** patrickjrall@gmail.com  
October 14, 1994 in Munich      **Mobile:** +1 512 783 8526  
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Home Address	Residence Address
Bozzarisstr. 39f	3320 Harmon Avenue
81545 Munich	Apt. 539
Germany	78705 Austin, TX
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**Graduate Studies**      *since August 2016:* **University of Texas at Austin** - Physics PhD Program  
Research scientist at the **Quantum Information Center** under Dr. Scott Aaronson

**Undergraduate Studies**      *2012 - June 2016:* **California Institute of Technology (Caltech)** - Class of 2016  
**Major in Physics**, Minor in Computer Science

**Research**      *Aug 28 2019:* Scott Aaronson, Patrick Rall. **Quantum Approximate Counting, Simplified.** [quant-ph/1908.10846](https://arxiv.org/abs/quant-ph/1908.10846)

*Jan 25 2019:* Patrick Rall, Daniel Liang, Jeremy Cook, William Kretschmer. **Simulation of Qubit Quantum Circuits via Pauli Propagation.**  
[Phys. Rev. A 99, 062337.](https://arxiv.org/abs/Phys.Rev.A.99.062337) [quant-ph/1901.09070](https://arxiv.org/abs/quant-ph/1901.09070). Poster presentation at SQuInT 2019.

*Fall 2018:* **Qumquat: An experimental high-level quantum programming language.** <https://github.com/patrickrall/qumquat>.

*Apr 15 2018:* Patrick Rall. **Simulating Quantum Circuits by Shuffling Paulis.** [quant-ph/1708.09256](https://arxiv.org/abs/quant-ph/1708.09256). Conference talks at APS March Meeting 2018, and the Discrete Phase Space Methods workshop, Bad Honnef, August 2018.

*Aug 30 2017:* Patrick Rall. **Fractal Properties of Magic State Distillation.** [quant-ph/1708.09256](https://arxiv.org/abs/quant-ph/1708.09256). Conference talk at the 3rd International Conference for Young Quantum Information Scientists (YQIS) 2017.

*Feb 24 2017:* Patrick Rall. **Signed quantum weight enumerators characterize qubit magic state distillation.** [quant-ph/1702.06990](https://arxiv.org/abs/quant-ph/1702.06990)

*2016-17:* **Quantum Circuit Simulator** An implementation of Sergei Bravyi and David Gosset's algorithm ([quant-ph/1601.07601](https://arxiv.org/abs/quant-ph/1601.07601)) written together with Iskren Vankov. Available on Github here: <https://github.com/patrickrall/circuitsimulator>

**Teaching**      *Spring 2019:* TA for **Quantum Complexity Theory**.  
Prof. Scott Aaronson (UT Austin). Graduate course.

*2018:* TA for the **Quantum Computing Freshman Research Initiative (FRI)**.  
Prof. Brian La Cour (UT Austin). Three semester (Spring, Summer, Fall) introductory course with optics laboratory component.

*Spring 2017:* TA for **Introduction to Quantum Information Science**.  
Prof. Scott Aaronson (UT Austin). Junior-level undergraduate course.  
<http://www.scottaaronson.com/cs378/>

*Fall 2016:* TA for **General Physics II** - Prof. Zhen Yao (UT Austin)  
Undergraduate physics course intended for pre-meds.

**Academic  
Advising**

**Bryce Fuller**, UT Austin class of 2019,  
now Quantum Computing Applications Researcher IBM.  
**Jeremy Cook**, UT Austin student intending to graduate 2020.  
**Jerimiah Wright**, UT Austin class of 2019.  
**Naveen Venkat, Thinh Ngo**: Texas high school students, Spring/Summer 2019.

**Skills**

**Programming languages:** C++, Python, Haskell, HTML, CSS, JS, PHP, L<sup>A</sup>T<sub>E</sub>X  
**Software:** Mathematica, Git, Django, Apache, Photoshop, ROOT  
**Computing:** Arch Linux, Ubuntu Linux, CentOS, Mac OS X, Windows  
**Languages:** English and German

**Pre-Graduate  
Research  
Experience**

*2015:* **California Institute of Technology**, Pasadena: Institute for Quantum Information and Matter (IQIM) - “The Quantum Game of Life” (3 months)  
Mentor: Dr. John Preskill (Richard P. Feynman Professor of Theoretical Physics)  
Co-mentors: Nicole Yunger Halpern, Dr. Ning Bao  
Seminar for Prof. Immanuel Bloch’s research group at LMU, Munich on Dec. 15, 2015  
<http://patrickrall.com/pregrad/PatrickRallQuantumCellularAutomata.pdf>

*2014:* **California Institute of Technology**, Pasadena: IQIM  
High-sensitivity pump-probe spectroscopy to investigate ultrafast phase transitions in Ca<sub>2</sub>RuO<sub>4</sub> (3 months, SURF report and seminar)  
Mentor: Dr. David Hsieh, Co-mentor: Hao Chu : *2013:* **German Aerospace Center (DLR)**, Oberpfaffenhofen: Robotics and Mechatronics Center (RMC) - Fiber-optic sensor real-time signal processing (2 months)  
Helmholtz Association, Mentor: Patrick Leyendecker  
<http://patrickrall.com/pregrad/PatrickRallFiberBraggGratings.pdf>

*2011:* **Orbit Determination of 1951 Lick**  
with Fengning Ding and Jason Liu at SSP 2011  
<http://patrickrall.com/pregrad/PatrickRallOrbitDetermination.pdf>

*2012:* **Max-Planck-Institute for Physics**, Munich: Assistance with measurements of silicon detectors and software development for ATLAS data analysis (2 months)  
*2010:* **Max-Planck-Institute for Physics**, Munich: Analysis of top-quark properties in simulated scattering events with the ATLAS experiment at the LHC (4 months)  
Werner Heisenberg Institute  
Mentor: Dr. habil. Richard Nisius (ATLAS Inner-Detector Group Leader)  
<http://patrickrall.com/pregrad/PatrickRallTopQuarkJets.pdf>

**High School  
Education**

**Munich International School - International Baccalaureate** - Class of 2012

*Last update: August 2019*