

Ramona Wolf

POSTDOCTORAL RESEARCHER IN THE QUANTUM INFORMATION THEORY GROUP AT ETH ZÜRICH

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Employment

Postdoctoral Researcher

ETH ZÜRICH, QUANTUM INFORMATION THEORY GROUP

Scientific advisor: Prof. Dr. Renato Renner

Zurich, Switzerland

since Feb 2021

Research Assistant

LEIBNIZ UNIVERSITÄT HANNOVER, QUANTUM INFORMATION THEORY GROUP

Hanover, Germany

Nov 2017 – Dec 2020

Student Employee

LEIBNIZ UNIVERSITÄT HANNOVER, INSTITUTE FOR THEORETICAL PHYSICS

- Tutor for several courses in theoretical physics
- Assistant at the Freshmen Welcome Days

Hanover, Germany

Apr 2014 – Sep 2017

Education

Doctor of Natural Sciences in Physics

LEIBNIZ UNIVERSITÄT HANNOVER

Thesis topic: [Microscopic Models for Fusion Categories](#)

Supervisor: Prof. Dr. Tobias J. Osborne

Hanover, Germany

Nov 2017 – Dec 2020

Master of Science in Physics

LEIBNIZ UNIVERSITÄT HANNOVER

Thesis topic: Fusion in tensor categories

Thesis supervisor: Prof. Dr. Tobias J. Osborne

Hanover, Germany

Oct 2015 – Sep 2017

Bachelor of Science in Physics

LEIBNIZ UNIVERSITÄT HANNOVER

Thesis topic: Quantum key distribution in the non-asymptotic regime

Thesis supervisor: Prof. Dr. Tobias J. Osborne

Hanover, Germany

Oct 2012 – Nov 2015

Publications & Preprints

BOOK

Quantum Key Distribution

AN INTRODUCTION WITH EXERCISES

[Lecture Notes in Physics 988](#), Springer International Publishing

August 2021

PEER-REVIEWED JOURNALS

Computing associators of endomorphism fusion categories

WITH D. BARTER AND J.C. BRIDGEMAN

Publication: [SciPost Physics 13](#), 029 (2022)

Preprint: [arXiv:2110.03644](#)

August 2022

Critical lattice model for a Haagerup conformal field theory

June 2022

WITH R. VANHOVE, L. LOOTENS, M. VAN DAMME, T. OSBORNE, J. HAEGEMAN, AND F. VERSTRAETE

Publication: [Physical Review Letters](#) **128**, 231602 (2022)

Preprint: [arXiv:2110.03532](#)

Device-independent quantum key distribution with random key basis

May 2021

WITH R. SCHWONNEK, K. T. GOH, I. W. PRIMAATMAJA, E. Y.-Z. TAN, V. SCARANI, AND C. C.-W. LIM

Publication: [Nature Communications](#) **12**, 2880 (2021)

Preprint: [arXiv:2005.02691](#)

Generalized string-nets for unitary fusion categories without tetrahedral symmetry

September 2020

WITH A. HAHN

Publication: [Physical Review B](#) **102**, 115154 (2020)

Preprint: [arXiv:2004.07045](#)

Gauging defects in quantum spin systems: A case study

April 2020

WITH J. BRIDGEMAN, A. HAHN, AND T. J. OSBORNE

Publication: [Physical Review B](#) **101**, 134111 (2020)

Preprint: [arXiv:1910.10619](#)

Training deep quantum neural networks

February 2020

WITH K. BEER, D. BONDARENKO, T. FARRELLY, T. J. OSBORNE, R. SALZMANN, AND D. SCHEIERMANN

Publication: [Nature Communications](#) **11**, 808 (2020) (part of the collection “2020 Top 50 Physics Articles”)

Preprint: [arXiv:1902.10445](#)

Entanglement detection by violations of noisy uncertainty relations: A proof of principle

June 2019

WITH Y.-Y. ZHAO, G.-Y. XIANG, X.-M. HU, B.-H. LIU, C.-F. LI, G.-C. GUO, AND R. SCHWONNEK

Publication: [Physical Review Letters](#) **122**, 220401 (2019)

Preprint: [arXiv:1810.05588](#)

PREPRINTS

Quantum Advantage in Cryptography

June 2022

WITH R. RENNER

Preprint: [arXiv:2206.04078](#)

The F-symbols for the H3 Fusion Category

June 2019

WITH T. J. OSBORNE AND D. E. STIEGEMANN

Preprint: [arXiv:1906.01322](#)

From categories to anyons: a travelogue

November 2018

WITH K. BEER, D. BONDARENKO, A. HAHN, M. KALABAKOV, N. KNUST, L. NIERMANN, T. J. OSBORNE, C.

SCHRIDDE, S. SECKMEYER, D. E. STIEGEMANN

Preprint: [arXiv:1811.06670](#)

Talks

Quantum Key Distribution Summer School

August 2022

INSTITUTE FOR QUANTUM COMPUTING, UNIVERSITY OF WATERLOO

Talk: Composability

- Quantum Center General Meeting** July 2022
 SCHATZALP, SWITZERLAND
 Talk: True randomness from quantum physics
- Group seminar** June 2022
 QUANTUM GROUP AT UNIVERSITY OF GHENT
 Talk: An introduction to quantum cryptography
- GAPT seminar** March 2022
 CARDIFF UNIVERSITY (ONLINE)
 Invited talk: From subfactors to conformal field theories via lattice models
- HEP-GR Seminar** February 2022
 INSTITUT FÜR THEORETISCHE PHYSIK, UNIVERSITÄT LEIPZIG, GERMANY
 Invited talk: From subfactors to conformal field theories via lattice models
- University Quantum Symmetries Lectures** February 2022
 NORTH CAROLINA STATE UNIVERSITY, USA (ONLINE)
 Invited talk: Computing F -symbols of endomorphism fusion categories
- QSIT Lunch Seminar** December 2021
 ETH ZÜRICH, SWITZERLAND
 Talk: Challenges for Practical Device-Independent Quantum Key Distribution
- AMS Fall Western Virtual Sectional Meeting** October 2021
 ONLINE (FORMERLY AT UNIVERSITY OF NEW MEXICO, USA)
 Invited talk: From subfactors to CFTs via physical models
- Workshop “Device-Independent Quantum Key Distribution”** September 2021
 ETH ZÜRICH, SWITZERLAND
 Talk: Composability in QKD
- Online student seminar on quantum symmetries** July 2020
 OHIO STATE UNIVERSITY, USA (ONLINE)
 Invited talk: Towards a Haagerup CFT
- Research visit at CQT (Singapore)** March 2019
 CENTRE FOR QUANTUM TECHNOLOGIES, SINGAPORE
 Talk: Efficient Learning for Deep Quantum Neural Networks (video available on [youtube](#))

Awards & Funding

- Grant for the program “Research in Pairs” at MFO** October 2021
 GRANTED BY MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH
 Grant for a two-week research stay at Mathematisches Forschungsinstitut Oberwolfach (MFO), taking place in 2022. Project title: *A Framework for Verifying the Existence of Conformal Field Theories from Subfactors*.
- QSIT INSPIRE Postdoc Award** July 2021
 AWARDED BY THE NCCR “QUANTUM SCIENCE AND TECHNOLOGY”
 The [QSIT INSPIRE Postdoc Award](#) supports outstanding female researchers at the beginning of their career who conduct their research in one of the laboratories of the [NCCR QSIT network](#) in Switzerland.
- Travel grant for the workshop “Quantum Symmetries” at MSRI** January 2020
 AWARDED BY THE MATHEMATICAL SCIENCES RESEARCH INSTITUTE, BERKELEY
 This grant covered the travel costs for participation in the workshop [Quantum Symmetries](#) at the [Mathematical Sciences Research Institute](#) in Berkeley, California (January 27–31 2020).

AWARDED BY MATHEMATISCHES FORSCHUNGSINSTITUT OBERWOLFACH

The [OWLG program](#) supports junior researchers by covering the travel costs for a stay at the [MFO](#). Granted to support participation in the workshop [Subfactors and Applications \(1944\)](#) at MFO (October 27–November 2 2019).

Academic Service and Teaching

Organization

- Workshop “[Device-Independent Quantum Key Distribution](#)” (August 31–September 2 2021) at ETH Zürich
- Group seminar of the Quantum Information Theory Group at Leibniz Universität Hannover (2018–2020)

Referee for Scientific Journals

- Physical Review {A, B, Letters, X Quantum}
- Quantum Science and Technology
- Quantum Machine Intelligence
- Communications in Mathematical Physics
- Annals of Physics

Lecturer

INCLUDES ORGANIZING AND GIVING LECTURES, GRADING STUDENT TALKS

- Seminar “Security of Quantum Key Distribution” (2020), held as an online seminar (videos available on [youtube](#))

Teaching Assistant

INCLUDES MAKING/GRADING EXERCISE SHEETS, GIVING EXERCISE CLASSES, HELPING STUDENTS WITH TALKS, SUBSTITUTING FOR THE LECTURER

- Lecture “Advanced Quantum Mechanics” (2022)
- Lecture “General Mechanics” (2021)
- Lecture “Theory of Heat” (2021)
- Proseminar “Self-similarity and fractals” (2020)
- Lecture “Computational Physics” (2019/2020)
- Proseminar “Special topics of classical theoretical physics” (2019)
- Several courses in theoretical physics for undergraduate students (2014-2017)

Student Supervision

- Computing key rates for device-independent QKD – M. Sandfuchs (Master project)
- Anyon chains for fusion categories with multiplicities – C. Schridde (Master project)
- Source-device-independent quantum random number generation – M. Steinbach (Bachelor project)
- Noise robustness of quantum neural networks – D. Scheiermann (Bachelor project)
- Microscopic models for the Haagerup fusion category – A. Hahn (Master project)
- Trivalent categories – C. Schridde (Bachelor project)