

Education

Ph.D. in Physics

LEIBNIZ UNIVERSITÄT HANNOVER

Thesis topic: Microscopic Models for Fusion Categories
Supervisor: 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: 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: Tobias J. Osborne

Hanover, Germany

Oct 2012 – Nov 2015

Employment

Postdoctoral Researcher

ETH ZÜRICH

Research Assistant

LEIBNIZ UNIVERSITÄT HANNOVER

Student Employee

LEIBNIZ UNIVERSITÄT HANNOVER

- Tutor for several courses in theoretical physics
- Assistant at the Freshmen Welcome Days 2016

Zurich, Switzerland

since Feb 2021

Hanover, Germany

Nov 2017 – Dec 2020

Hanover, Germany

Apr 2014 – Sep 2017

Publications & Preprints

Generalized string-nets for unitary fusion categories without tetrahedral symmetry

WITH A. HAHN

Publication: [Physical Review B 102, 115154 \(2020\)](#)
Preprint: [arXiv:2004.07045](#)

September 2020

Robust Device-Independent Quantum Key Distribution

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

Preprint: [arXiv:2005.02691](#)

May 2020

Gauging defects in quantum spin systems: A case study

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

Publication: [Physical Review B 101, 134111 \(2020\)](#)
Preprint: [arXiv:1910.10619](#)

April 2020

Training deep quantum neural networks

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

Publication: [Nature Communications 11, 808 \(2020\)](#)
Preprint: [arXiv:1902.10445](#)

February 2020

The F-symbols for the H3 Fusion Category

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

Preprint: [arXiv:1906.01322](#)

June 2019

Entanglement detection by violations of noisy uncertainty relations:

June 2019

A proof of principle

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](#)

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 & Posters

Online student seminar on quantum symmetries

July 2020

ORGANIZED BY OHIO STATE UNIVERSITY

Talk: Towards a Haagerup CFT

Quantum Information

June/July 2019

CENTRO DE CIENCIAS DE BENASQUE PEDRO PASCUAL, BENASQUE, SPAIN

Talk: Entanglement detection by violations of noisy uncertainty relations

Research visit

March 2019

CENTRE FOR QUANTUM TECHNOLOGIES, SINGAPORE

Talk: Efficient Learning for Deep Quantum Neural Networks (video available on [youtube](#))

Summer School: Secure Quantum Communication

May 2018

HOTEL PARADOR, BAIONA, SPAIN (ORGANIZED BY QCALL NETWORK)

Poster: F -Symbols for Trivalent Categories

Quantum Information Processing

January 2018

QUITECH, DELFT UNIVERSITY OF TECHNOLOGY, DELFT, THE NETHERLANDS

Poster: F -Symbols for Trivalent Categories

Teaching

Instructor

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 GRADING EXERCISE SHEETS, GIVING EXERCISE CLASSES, HELPING STUDENTS PREPARE TALKS

- 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

TOGETHER WITH PROF. OSBORNE

- 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)

Other Activities

- Referee for Physical Review Letters, Physical Review A, and Quantum Machine Intelligence
- Seminar organization for the Quantum Information Theory Group at Leibniz Universität Hannover
- Graduate student speaker of the Research Training Group 1991 (“Quantum mechanical noise in complex systems”)