

# Jonas Nothhelfer

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Researcher ID: V-1835-2019

## Personal information

Name Jonas Nothhelfer  
Date of birth 01.04.1995  
Nationality German



## Scientific interests

Topological quantum computation, superconducting vortices, skyrmions, quantum computation with trapped ions, light matter interaction

## Studies and Education

### University

04/2019

**Doctoral studies in Physics**, Johannes Gutenberg-Universität, since 10/2019: Max Planck Graduate Center with Johannes Gutenberg-Universität Mainz (MPGC-JOGU).

Thesis preliminary titel: „Topological excitations in magnet-superconductor heterostructures “

1. Advisor Dr. Karin Everschor-Sitte
2. Advisor Prof. Dr. Kjetil Hals
1. Mentor Prof. Dr. Matteo Rizzi
2. Mentor Dr. Tobias Meng

04/2017–03/2019

**Master studies in Physics**, Johannes Gutenberg-Universität Mainz, Degree: M.Sc. Physics.  
Grade: 1.3

Thesis titel: „Localized Majorana modes in superconductor-ferromagnet heterostructures - A path towards topological quantum computation“

Advisor Dr. Karin Everschor-Sitte, Juniorprof. Dr. Matteo Rizzi  
Second corrector Prof. Dr. Mathias Kläui  
Grade 1.3

05/2015 – 05/2017

**Research assistant**, Quanten-, Atom- und Neutronenphysik an der Uni Mainz (QUANTUM) - Quantenbit group of Prof. Dr. Schmidt-Kaler, Johannes Gutenberg-Universität Mainz.

04/2014 – 05/2017

**Bachelor studies in Physics**, Johannes Gutenberg-Universität Mainz, Degree: B.Sc. Physics.  
Grade: 2.1

Thesis „Optikaufbau zum Treiben stimulierter Ramanübergänge“  
Advisor Prof. Dr. Ferdinand Schmidt-Kaler  
Second corrector Prof. Dr. Jochen Walz

## School

08/2005 – 03/2014

**Gymnasium, Gymnasium zu St. Katharinen Oppenheim,**  
Degree: Abitur.

Participation in several orchestras and big bands

04/2014

• **Attending the lectures „Physik am Samstag“, Johannes Gutenberg-Universität Mainz.**

Insight for pupils into the everyday work of researchers

04/2013–05/2013

• **Attending the lectures „Physik am Samstag“, Johannes Gutenberg-Universität Mainz.**

03/2013

• **International Masterclasses, hands on particle Physics, CERN, Switzerland.**

Students evaluate real data from particle Physics experiments for one day with an international video conference to discuss the results.

2011

• **Participation in the math competition „Mathematik ohne Grenzen“.**

2010

• **Participation in the math competition „Mathematik ohne Grenzen“.**

Mathematics competition for classes and courses of the 10th and 11th grade in Rhineland-Palatinate, in which a task is to be worked on in a foreign language

05/2009

• **Versailles Orchesteraustausch, Versailles, France.**

25 pupils from the 8th grades host a French guest for a week and travel to France for 7 days

## Participation in organizations and other professional activities

09/2020–now Organisation of the students seminar in the MPGC

06/2020–now Student Speaker of the Max Planck Graduate Center (MPGC)

04/2020–now Organisation of the Joint Skyrmion meetings together with the experimental group of Prof. Kläui

## Teaching

WS 2020/2021 Co-supervisor of the bachelor thesis „Composite Topological Structures in Superconductor-Ferromagnet Heterostructures“ by Lucas Goerzen

WS 2019/2020 Tutor in Theoretical Physics 2 with Prof. Dr. Thomas Speck

SS 2019 Co-supervisor of the bachelor thesis „Analyse der lokalen Zustandsdichte in der Kitaev-Kette“ by Stephan Kessler

Tutor in Theoretical Physics 1 with Prof. Dr. Thomas Speck

WS 2018/2019 Tutor in Theoretical Physics 4 with Prof. Dr. Jairo Sinova and Dr. Karin Everschor-Sitte

SS 2018 Tutor in Theoretical Physics 3 with Prof. Dr. Marc Vanderhaeghen

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## Conferences/Workshops

- 17-19/10/2020 **Coherent order and transport in spin active systems**, *Spin Phenomena Interdisciplinary Center (SPICE)*, Mainz, Germany.
- 19-22/10/2020 **Topological Superconductivity in Quantum Materials**, *Spin Phenomena Interdisciplinary Center (SPICE)*, Mainz, Germany.  
Online Workshop
- 15/10/2020 **What to do with a PhD?**, *Allgemeines Promotions Kolleg (APK)*, Mainz, Germany.  
Online Conference
- 05-09/10/2020 **GPU Technology Conference**, *Nvidia*, Germany.  
Online Conference
- 13/09/2020 **Stuttgarter Industriegespräch**, *DPG*, Germany.  
Online Seminar
- 14,30/07/2020 **Patent Seminar**, *SPIN+X*, Mainz, Germany.  
Online Seminar
- 15,17,23,26/06/2020 **Scientific Writing**, *SPIN+X*, Mainz, Germany.  
Online Seminar
- 03-04/03/2020 **Targeted communication**, *Allgemeines Promotions Kolleg (APK)*, Mainz, Germany.
- 18-19/02/2020 **Project management**, *Allgemeines Promotions Kolleg (APK)*, Mainz, Germany.
- 23-27/09/2019 **DPG Fall Meeting**, *Deutsche Physikalische Gesellschaft (DPG)*, Freiburg, Germany.  
Joint Meeting of the Atomic, Molecular, Plasma Physics and Quantum Optics Section (SAMOP) Condensed Matter Section (SKM) Matter and Cosmos Section (SMuK)  
Poster „Majorana zero modes in skyrmion-vortex pairs“
- 17-19/09/2019 **Skyrmionics Workshop**, *Spin Phenomena Interdisciplinary Center (SPICE)*, Mainz, Germany.
- 03-04/09/2019 **Intercultural Communication**, *Allgemeines Promotions Kolleg (APK)*, Mainz, Germany.
- 13-16/06/2019 **CRC-Workshop**, *Collaborative Research Center (CRC) 183*, Bad Honnef, Germany.  
Topological Quantum Field Theory and Quantum Hall Physics  
Poster „Asymmetric skyrmion Hall effect in systems with a hybrid Dzyaloshinskii-Moriya interaction“
- 07-15/05/2019 **ICTP Summer School**, *International Centre for Theoretical Physics (ICTP)*, Samarkand, Usbekistan.  
Advances in Condensed Matter Physics: New trends and Materials in Quantum Technologies
- 08-10/04/2019 **HLRS Workshop**, *High Performance Computing Center Stuttgart (HLRS)*, Frankfurt, Germany.  
Hessisches Kompetenzzentrum für Hochleistungsrechnen (HKHLR) Tutorial: Parallelization with MPI and OpenMP
- 31/03-05/04/2019 **DPG Spring Meeting**, *Deutsche Physikalische Gesellschaft (DPG)*, Regensburg, Deutschland.  
Condensed Matter Section (SKM)

- Poster „Asymmetric skyrmion Hall effect in systems with a hybrid Dzyaloshinskii-Moriya interaction“
- 01-08/11/2018 **Measuring travel to Swiss Light Source (SLS)**, *Paul Scherrer Institut (PSI)*, Villigen, Switzerland.  
Synchrotron light source for detailed 3D imaging of matter
- 07-13/10/2018 **Research stay**, *University of Agder*, Grimstad, Norway.  
Visit Prof. Dr. Kjetil Hals
- 08-15/10/2018 **Spin Qubit 4**, *Universität Konstanz*, Konstanz, Germany.  
Conference for Spin-based quantum information processing
- 03-07/08/2018 **JEMS**, *Joint European Magnetic Symposia*, Mainz, Germany.  
European magnetism conference
- Poster „Asymmetric skyrmion Hall effect in systems with a hybrid Dzyaloshinskii-Moriya interaction“
- 16-23/07/2018 **Measuring travel to Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung (BESSY)**, *Helmholtz-Zentrum Berlin (HZB)*, Berlin, Germany.  
Synchrotron light source for detailed 3D imaging of matter
- 11-19/05/2018 **Measuring travel to Swiss Light Source (SLS)**, *Paul Scherrer Institut (PSI)*, Villigen, Switzerland.  
Synchrotron light source for detailed 3D imaging of matter

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## Publications

- [1] **Asymmetric Skyrmion Hall Effect in Systems with Hybrid Dzyaloshinskii-Moriya Interaction**, *K-W. Kim, K-W. Moon, N. Kerber, J. Nothhelfer and K. Everschor-Sitte.*  
Physical Review B **97**, 224427 (2018) or arXiv:1802.07327

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## Patents

- 06/2019 **Patent in the field of topological quantum computation**, *J. Nothhelfer, K. M. Hals, K. Everschor-Sitte, and M. Rizzi.*  
pending at the European Patent Office under patent number: 19179910.5-12221

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## Expertise

### Programming

- Python very good, 5 years of experience  
 Git good, 8 years of experience  
 HPC good, 2 years of experience  
 C++ good, 2 years of experience  
 Fortran good, 2 years of experience  
 Java good, 1 year of experience

### Software

- Mathematica very good, 7 years of experience  
 L<sup>A</sup>T<sub>E</sub>X very good, 5 years of experience

Inkscape very good, 4 years of experience  
MuMax<sup>3</sup> good, 3 years of experience  
Matlab good, 2 years of experience  
Blender good, 2 years of experience

### Operating systems

Windows very good, 10+ years  
Linux very good, 4 years  
MacOs good, 3 years

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### Others

#### Languages

German **Mother tongue.**  
English **Fluent.**  
French **Good.**

#### Hobbies

Music Saxophone (more than 10 years, 6 years of lessons at the Peter Cornelius Conservatorium in Mainz), Piano (since 6 years)  
Sports Weight training, gymnastics, hiking

*Jonas Nothhelfer*

Mainz, December 8, 2020