# Robin Schäfer

*Dr. rer. nat.*

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## Current position

March 2023 – present **Postdoctoral Associate**, *Boston University*

- Working in the Quantum Condensed Matter Physics division with Anushya Chandran, Christopher Laumann, Anatoli Polkovnikov, and Claudio Chamon
- Areas of interest: Frustrated magnetism, topological order, chaos in interacting many-body systems, and non-equilibrium dynamics

## Doctoral studies

Nov. 2018 – Dec. 2022 **Dr. rer. nat.**, *Max Planck Institute for the Physics of Complex Systems*

- Dissertation: **Magnetic frustration in three dimensions – summa cum laude**
- Supervised by: David J. Luitz and Roderich Moessner
- **Otto Hahn medal** awarded by the Max Planck Society for outstanding achievements
- **Best Doctoral Thesis** within CRC-1143 (Correlated Magnetism: From Frustration to Topology) in 2023
- Student of the International Max Planck Research Schools
- Postdoctoral researcher from Jan. 2023 – Feb. 2023

## Education

Sep. 2016 – Aug. 2018 **M.Sc. Physics**, *TU Dortmund*

- *Grade:* **1.0** (Range: 1.0 - 4.0) - **graduated as best student of the year**
- *Thesis: Floquet time crystals and periodically driven quantum state transfer*
- *Supervised by:* Joachim Stolze and Götz S. Uhrig

Sep. 2016 – April 2019 **M.Sc. Mathematics**, *TU Dortmund*

- *Grade:* **1.4** (Range: 1.0 - 4.0)
- *Thesis: Density functional theory on unbounded domains*
- *Supervised by:* Christian Meyer

Sep. 2016 – June 2017 **Exchange student**, *Korea Advanced Institute of Science and Technology (KAIST)*

- GPA: 3.83/4.3

Oct. 2013 – Aug. 2016 **B.Sc. Physics**, *TU Dortmund*

- *Grade:* **1.3** (Range: 1.0 - 4.0)
- *Thesis: Dynamics of wave packets in a magnetic field*
- *Supervised by:* Joachim Stolze

Oct. 2013 – Aug. 2016 **B.Sc. Mathematics**, *TU Dortmund*

- *Grade:* **1.6** (Range: 1.0 - 4.0)
- *Thesis: Operator splitting of the heat equation in cylindrical coordinates*
- *Supervised by:* Stefan Turek

## Distinctions and scholarships

August 2024 **Distinction**, *Thesis award by the CRC-1143 "Correlated Magnetism: From Frustration to Topology"*

June 2024 **Distinction**, ***Otto Hahn medal*** *awarded by the Max Planck Society for outstanding scientific achievements during the Ph.D.*

June 2022 **Distinction**, *Poster award at the HFM2022 conference in Paris*

Aug. 2018 **Distinction**, *Best student of the year in M.Sc. Physics*

Sep. 2016 **Scholarship**, *Funded by the German Academic Exchange Service (DAAD) for the student exchange at KAIST*

Oct. 2015 **Scholarship**, *Funded by the German government and the Alumni club of the Physics Department PeP et al. e.V. at TU Dortmund*

Oct. 2014 **Scholarship**, *Funded by the German government and the Alumni club of the Physics Department PeP et al. e.V. at TU Dortmund*

## Dissertation

**R. Schäfer**
*Magnetic frustration in three dimensions*
Dissertation published via TU Dresden (2022)

## Publication list

[13] E. M. Smith, **R. Schäfer**, *et al.*
*Single Crystal Diffuse Neutron Scattering Study of the Dipole-Octupole Quantum Spin Ice Candidate $Ce_2Zr_2O_7$: No Apparent Octupolar Correlations Above T=0.05K*
Phys. Rev. X 15, 021033 (2025)

[12] **R. Schäfer**, and D. J. Luitz
*DanceQ: High-performance library for number conserving bases*
*SciPost Phys. Codebases 48 (2025)*
*DanceQ repository* and *DanceQ documentation*

[11] Z. Lu, **R. Schäfer**, J. N. Hallén, C. R. Laumann
*[111]-strained spin ice: Localization of thermodynamically deconfined monopoles*
Phys. Rev. B 110, 184421 (2024)

[10] D. Yahne, B. Placke, **R. Schäfer**, *et al.*
*Dipolar spin ice regime proximate to an all-in-all-out Néel ground state in the dipolar-octupolar pyrochlore $Ce_2Sn_2O_7$*
Phys. Rev. X 14, 011005 (2024)

[9] J. Beare, E. M. Smith, J. Dudemaine, **R. Schäfer**, *et al.*
*$\mu$SR Study of the Dipole-Octupole Quantum Spin Ice Candidate $Ce_2Zr_2O_7$*
Phys. Rev. B 108, 174411 (2023)

[8] E. M. Smith, J. Dudemaine, B. Placke, **R. Schäfer**, *et al.*
*Quantum Spin Ice Response to a Magnetic Field in the Dipole-Octupole Pyrochlore $Ce_2Zr_2O_7$*
Phys. Rev. B 108, 054438 (2023)

[7] **R. Schäfer**, B. Placke, O. Benton, and R. Moessner
*Abundance of hard-hexagon crystals in the quantum pyrochlore antiferromagnet*
Phys. Rev. Lett. 131, 096702 (2023)

[6] **R. Schäfer**, J. C. Budich, and D. J. Luitz
*Symmetry protected exceptional points of interacting fermions*
Phys. Rev. Research 4, 033181 (2022)

[5] I. Hagymási, **R. Schäfer**, R. Moessner, and D. J. Luitz
*Magnetization process and ordering of the $S = 1/2$ pyrochlore Heisenberg antiferromagnet in a magnetic field*
Phys. Rev. B 106, L060411 (2022)

[4] E. Smith, O. Benton, D. Yahne, B. Placke, **R. Schäfer**, *et al.*
*The case for a $U(1)\pi$ Quantum Spin Liquid Ground State in the Dipole-Octupole Pyrochlore $Ce_2Zr_2O_7$*
Phys. Rev. X 12, 021015 (2022)

[3] I. Hagymási, **R. Schäfer**, R. Moessner, and D. J. Luitz
*Possible Inversion Symmetry Breaking in the $S = 1/2$ Pyrochlore Heisenberg Magnet*
Phys. Rev. Lett. 126, 117204 (2021)

[2] **R. Schäfer**, I. Hagymási, R. Moessner, and D. J. Luitz
*Pyrochlore $S = \frac{1}{2}$ Heisenberg antiferromagnet at finite temperature*
Phys. Rev. B 102, 054408 (2020)

[1] **R. Schäfer**, G. S. Uhrig, and J. Stolze
*Time-crystalline behavior in an engineered spin chain*
Phys. Rev. B 100, 184301 (2019)

## Preprints

[1] E. M. Smith, A. Fitterman, **R. Schäfer**, *et al.*
*Two-Peak Heat Capacity Accounts for $R\ln(2)$ Entropy and Ground State Access in the Dipole-Octupole Pyrochlore $Ce_2Hf_2O_7$*
arXiv:2501.08327 (2025)

## Software libraries

[1] **DanceQ**: Repository, Documentation