Robin Schäfer

Dr. rer. nat.

✉ *rschaefe@bu.edu*
🌐 *robin-schaefer.github.io*
🆔 *0000-0001-9728-2371*
ⓡ *NX7j0dsAAAAJ*

Research positions

Aug. 2025 – present
Postdoctoral Researcher, *Helmholtz-Zentrum Berlin*
○ Department of Theory of Novel Quantum Materials, led by Johannes Reuther

Mar. 2023 – Jul. 2025
Postdoctoral Associate, *Boston University*
○ Quantum Condensed Matter Theory Group, in collaboration with Anushya Chandran, Christopher Laumann, Anatoli Polkovnikov, and Claudio Chamon

Doctoral studies

Nov. 2018 – Dec. 2022
Dr. rer. nat., *Technische Universität Dresden*
Research conducted at the 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 School
○ 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); GPA equivalent: 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); GPA equivalent: 3.7
○ *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)); GPA equivalent: 3.7
○ *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)); GPA equivalent: 3.7
	○ *Thesis: Operator splitting of the heat equation in cylindrical coordinates*
	○ *Supervised by:* Stefan Turek

Distinctions and Scholarships

Nov. 2025	**Scholarship**, *Walter Benjamin Fellowship for a two-year position at Harvard University with Norman Yao*
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

[16] **R. Schäfer**, P. Ebert, N. Hassan, J. Reuther, D. Luitz, A. Wietek
Thermodynamics of the Heisenberg antiferromagnet on the maple-leaf lattice
Zeitschrift für Naturforschung A. (zna-2025-0382)

[15] D. Vuina, **R. Schäfer**, D. M. Long, A. Chandran
Probing Hilbert space fragmentation using controlled dephasing
Phys. Rev. B 112, 134305 (2025)

[14] 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 $Ce_2Hf_2O_7$
Phys. Rev. Lett. 135, 086702 (2025) — Editor's Suggestion

[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.*
μSR 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)
— **Featured in** Quantum Science and Technology Collection

[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] **R. Schäfer**, C. Chamon, C. R. Laumann
Hall-on-Toric: Descendant Laughlin state in the chiral $\mathbb{Z}_p$ toric code
arXiv:2507.02035 (2025)

[2] H. Kim, **R. Schäfer**, D. M. Long, A. Polkovnikov, A. Chandran
— **shared first authorship**
Confined and deconfined chaos in classical spin systems
arXiv:2507.07168 (2025)

Software libraries

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

Media

[1] Article in Quantum Zeitgeist, July 2025.

Refereeing

[1] SciPost Phys. Codebases 10 (2023)
Automatic transformation of irreducible representations for efficient contraction of
tensors with cyclic group symmetry
by *Yang Gao, Phillip Helms, Garnet Kin-Lic Chan, Edgar Solomonik*

[2] XDiag: Exact Diagonalization for Quantum Many-Body Systems
by *Alexander Wietek, Luke Staszewski, Martin Ulaga, Paul L. Ebert, Hannes Karlsson,
Siddhartha Sarkar, Henry Shackleton, Aritra Sinha, Rafael D. Soares*

[3] by Alexander Wietek, Luke Staszewski, Martin Ulaga, Paul L. Ebert, Hannes Karlsson, Siddhartha Sarkar, Henry Shackleton, Aritra Sinha, Rafael D. SoaresAdaptive-basis sample-based neural diagonalization for quantum many-body systems by *Simone Cantori, Luca Brodoloni, Edoardo Recchi, Emanuele Costa, Bruno Juliá-Díaz, Sebastiano Pilati*