

# Robin Schäfer

Dr. rer. nat.

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## Research positions

- Aug. 2025 – **Postdoctoral Researcher**, *Helmholtz-Zentrum Berlin*  
present     Department of Theory of Novel Quantum Materials, led by Johannes Reuther
- Mar. 2023 – **Postdoctoral Associate**, *Boston University*  
Jul. 2025     Quantum Condensed Matter Theory Group, in collaboration with Anushya Chandran, Christopher Laumann, Anatoli Polkovnikov, and Claudio Chamon

## Doctoral studies

- Nov. 2018 **Dr. rer. nat.**, *Max Planck Institute for the Physics of Complex Systems*  
– Dec. 2022     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 **M.Sc. Physics**, *TU Dortmund*  
– Aug. 2018     **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 **M.Sc. Mathematics**, *TU Dortmund*  
– April 2019     **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 **Exchange student**, *Korea Advanced Institute of Science and Technology (KAIST)*  
– June 2017     GPA: 3.83/4.3
- Oct. 2013 **B.Sc. Physics**, *TU Dortmund*  
– Aug. 2016     **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 **B.Sc. Mathematics**, *TU Dortmund*  
– Aug. 2016     **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

- 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

- [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.  
 *$\mu$ 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 \(2022\)](#)  
— **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 \(2019\)](#)

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## 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)

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## Software libraries

- [1] **DanceQ**: [Repository](#), [Documentation](#)

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## Media

- [1] Article in [Quantum Zeitgeist](#), July 2025.