Ross Knapman

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Personal Information

Date of Birth	15th July 1997
Place of Birth	Northallerton, United Kingdom
Nationalities	British, German
Last Updated	January 2025

Education

2019–2024 **PhD**, *Johannes Gutenberg University Mainz*, Mainz, Germany.
Title: Creation and Manipulation of Topological Magnetic Textures in Chiral and Frustrated Magnets.
Grade: 1.0
Primary Supervisor: Prof. Dr. Karin Everschor-Sitte.
Secondary Supervisor: Prof. Dr. Jairo Sinova.

2015–2019 **Master of Physics**, *Durham University*, Durham, United Kingdom, *First Class Honours*.
Master's Project: Micromagnetic Simulations of Antiskyrmions.
Master's Project Supervisor: Prof. Peter Hatton.

2013–2015 **A Levels**, *Paston Sixth Form College*, North Walsham, United Kingdom, *A*A*A*Aa*.
Physics, Chemistry, Mathematics, Further Mathematics, AS Biology, AS Critical Thinking.

2011–2013 **GCSEs**, *Broadland High School*, Hoveton, United Kingdom, *7A*, 3A*.

Experience

Work Experience

06/2024–Present **Postdoctoral Researcher**, *University of Duisburg-Essen*, Duisburg, Germany.
Continuation of research into magnetization dynamics with the TWIST group at the University of Duisburg-Essen.

08/2019–05/2024 **Doctoral Student**, *Johannes Gutenberg University Mainz and University of Duisburg-Essen*, Mainz and Duisburg, Germany.
Modelling of magnetization dynamics using analytical and numerical methods. Doctoral thesis mainly funded by a competitive scholarship from the Studienstiftung des deutschen Volkes.

07/2018–08/2018 **Computational Condensed Matter Physics Internship**, *Durham University*, Durham, United Kingdom.
Computational project investigating magnetic fields experienced by muons in spin textures.

06/2017–09/2017 **DAAD RISE Research Internship**, *German Aerospace Center (DLR) Oberpfaffenhofen*, Weßling near Munich, Germany.
A highly competitive DAAD RISE research internship where I worked as part of a small team to develop a lidar system to detect atmospheric turbulence from airplanes.

University Societies

2018–19 **Co-President**, *Durham University Physics Society*.

2018–19 **Secretary**, *Durham University Astronomical Society*.

2017–18 **Treasurer**, *Durham University Astronomical Society*.

2016–18 **Publicity Officer**, *Durham University Physics Society*.

2016–17 **Webmaster**, *Durham University Astronomical Society*.

Awards

09/2021 **Third Place, IOP Publishing Emerging Leader Celebration 2021**.
Awarded for my poster showing results from our work proposing a protocol to create H-shaped skyrmions, held on Twitter.

05/2021 **Studienstiftung des deutschen Volkes Doctoral Scholarship**.
Doctoral scholarship given to students "who, because of their exceptional academic or artistic talents and personal qualities, can be expected to make an outstanding contribution to society as a whole". In addition to funding living expenses, the programme offers many opportunities for students to build their skills and network.

07/2019 **Florence Nightingale Prize for Graphical Excellence**.
Prize worth £100, given to one student in each year group per year at Durham University. Awarded for excellence in the illustration of antiskyrmion resonance modes in my Level 4 project report.

04/2017 **DAAD RISE Scholarship**.
The Research Internships in Science and Engineering (RISE) scholarship awarded by the DAAD is a prestigious scholarship that funds research placements in Germany, including living expenses, a travel allowance, and a conference in Heidelberg.

Teaching

Supervision

03/2022–05/2022 **Timon Tausendpfund**, Bachelor Thesis “From Skyrmions to Hopfions”.

Courses

WS 2023–24 **Tutor**, *Electrodynamics*, Prof. Dr. Thomas Guhr.

WS 2020–21 **Tutor**, *Experimental Physics 5c (Condensed Matter Physics)*, Prof. Jure Demsar.

SS 2020 **Senior Assistant**, *Mathematical Calculation Methods*, Prof. Dr. Jairo Sinova and Dr. Karin Everschor-Sitte.

WS 2019–20 **Tutor**, *Experimental Physics 5a (Atomic and Quantum Physics)*, Prof. Randolf Pohl.

Publications and Preprints

arXiv:2411.06929, *M. Azhar, S. C. Shaju, R. Knapman, A. Pignedoli, and K. Everschor-Sitte.*
3D Magnetic Textures with Mixed Topology: Unlocking the Tunable Hopf Index

arXiv:2410.22058, *R. Knapman, M. Azhar, A. Pignedoli, L. Gallard, R. Hertel, J. Leliaert, and K. Everschor-Sitte.*
Numerical Calculation of the Hopf Index for 3D Magnetic Textures

Communications Physics 7, 151, *R. Knapman, T. Tausendpfund, S. A. Díaz, and K. Everschor-Sitte.*
Spacetime magnetic hopfions from internal excitations and braiding of skyrmions

Journal of Physics D: Applied Physics 54, 404003, *R. Knapman, D. R. Rodrigues, J. Masell, and K. Everschor-Sitte.*
Current-induced H-shaped-skyrmion creation and their dynamics in the helical phase

Physical Review Applied 16, 014020, *D. R. Rodrigues, J. Nothhelfer, M. Mohseni, R. Knapman, P. Pirro, and K. Everschor-Sitte.*
Nonlinear Dynamics of Topological Ferromagnetic Textures for Frequency Multiplication

Workshops, Schools, and Conferences Attended

03/2024 **DPG Meeting of the Condensed Matter Section**, *Berlin, Germany.*
Talk: Spacetime Magnetic Hopfions from Internal Excitations and Braiding of Skyrmions

11/2023 **Numerical Methods for Topological Magnetic Textures**, *Karlsruhe, Germany.*
Talk: Modelling Skyrmions in Frustrated Magnets in MuMax^3

09/2023 **Trends in MAGnetism 2023**, *Rome, Italy.*
Talk: Hopfions in Spacetime

05/2023 **Theorie-Kolloquium der Fakultät für Physik**, *Duisburg, Germany.*
Talk: Construction of Topological Magnetic Structures

03/2023 **DPG Meeting of the Condensed Matter Section**, *Dresden, Germany.*
Talk: Hopfions in Spacetime.

01/2023 **CENIDE Workshop Artificial Intelligence**, *Duisburg, Germany.*
Workshop in which we discussed the relevance of artificial intelligence to a wide variety of research areas.

09/2022 **DPG Meeting of the Condensed Matter Section**, *Regensburg, Germany.*
Talk: Current-Induced H-Shaped Skyrmion Creation and Their Dynamics in the Helical Phase.

03/2022 **Studienstiftung Natur- und Ingenieurwissenschaftliches Kolleg IX**, *Weimar, Germany.*
Gave a talk on reservoir computing.

11/2021 **Studienstiftung Herbstforum Gesellschaft & Natur 2021 für Promvierende**, *Online.*
Talk: Tying Knots in Magnets: Investigating Skyrmions and Hopfions.

10/2021 **Joint School on Spin Physics (JSSP)**, *Apolda, Germany.*
Poster Contribution: Current-Induced H-Shaped Skyrmion Creation and Their Dynamics in the Helical Phase.

10/2021 **Parallel Programming Workshop (MPI, OpenMP and Advanced Topics)**, *Online*.
Five-day workshop on parallel computing using MPI and OpenMP.

09/2021– **DPG Meeting of the Condensed Matter Section**, *Online*.
10/2021 Talk: Current-Induced H-Shaped Skyrmion Creation and Their Dynamics in the Helical Phase.

07/2021 **Deep Learning and Acceleration with OpenACC on Nvidia GPUs**, *Online*.
Four-day workshop covering the fundamentals of deep learning, using Horovod to distribute deep learning over multiple GPUs, as well as using OpenACC to accelerate C/C++ code on GPUs.

06/2021 **Vom Defizit zum Dialog: Einführung in die Wissenschaftskommunikation**, *Online*.
Two-day Studienstiftung workshop on scientific communication with the public including lectures and group activities.

03/2021– **Do Research Like a Munchkin**, *Online*.
04/2021 Workshop on Agile software development and clean code, with emphasis on applying these concepts to the broader topic of research, not necessarily just in software development.

02/2021 **Exciting Dynamics: How Electrons, Spins, and Phonons Interact**, *Online*.
Poster Contribution: On-Demand Production of 3D Magnetic Textures by Electrical Means.

09/2020– **2020 European School on Magnetism**, *Online*.
10/2020 Series of lectures on various topics within magnetism.

09/2020 **How to Shape Your Future: Career Planning for PhD Students, PhDs and Postdocs**, *Online*.
Career planning workshop aimed primarily at early career researchers.

09/2020 **Intercultural Communication**, *Online*.
Workshop by Alexia Petersen on overcoming the challenges faced during cross-cultural communication and the reasons behind such challenges.

12/2019 **British-German WE-Heraeus-Seminar: Skyrmions in Magnetic Materials**, *Bad Honnef, Germany*.
Poster Contribution: Production of Magnetic Textures in Different Dimensions.

Skills

Programming and Technologies

Python 10 years of regular and extensive use in professional and personal contexts.

Shell Extensively use for automation of tasks such as running simulations.

C/C++ Intermediate knowledge for accelerating performance-critical parts of Python code and in hobby projects.

Git Daily use for version control of research codes. Familiar with basic principles of CI/CD processes such as automated unit testing, experience with contributions to open-source projects.

Linux Extensive use in both professional contexts (e.g. management of workstations in my research group) as well as privately (e.g. running services in my homelab).

Ansible Use for configuration of servers in the Faculty of Physics at the University of Duisburg-Essen.

Scientific Software and Graphics

MuMax^3	Micromagnetic simulation software written in Go. I often modify the source code for my research projects.
ParaView	For visualising micromagnetic simulation results.
SageMath	For computer algebra.
Blender	Have made extensive use for scientific figures (often with the Python API), as well as data visualisation.
POV-Ray	Use for scientific figures and data visualisation.
OpenGL	Basic experience from hobby projects.
LaTeX	Eight years of regular use.

Web

HTML/CSS	Use for making static websites.
Hugo	Use for simplifying the development of static sites such as my personal web page.

Languages

English	Native	
German	Goethe Certificate B2	*Speaking, Writing, Listening: 100/100, Reading: 93/100*
French	Elementary	