Swapneel Amit Pathak

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Education

Ph.D. | ***Physics*** — Aug 2017 – Mar 2021
University of Strasbourg — Strasbourg, France

Integrated Master of Science | ***Physics, Major: condensed matter physics*** — Jul 2009 – May 2014
Indian Institute of Technology Roorkee — Roorkee, India

Work Experience

Visiting Scientist — Oct 2021 – present
Scientific Support Unit for Computational Science, MPSD, CFEL — Hamburg, Germany

- Machine-learning models to cluster simulation data, extracting micromagnetic material parameters, and 3D reconstruction of magnetization field from experimental data
- Accelerating micromagnetic simulation Python package using NVIDIA CUDA kernels

Postdoctoral researcher — Apr 2022 – Jan 2023
University of Southampton, Computational Modelling Group — Southampton, UK

- Developing and maintaining Ubermag
- Magnetic skyrmion dynamics using vortex laser pulses
- Unsupervised machine-learning algorithms to cluster micromagnetic simulation data

Ph.D. Candidate (IdEx Fellow) — Aug 2017 – Mar 2021
CNRS, IPCMS, University of Strasbourg — Strasbourg, France

- Numerical implementation of DMI in micromagnetism
- Study of magnetic skyrmions in FeGe nanospheres
- Skyrmion confinement in non-centrosymmetric ferromagnets

Research Associate — Jul 2015 – Jul 2017
Tata Institute of Fundamental Research (TIFR) — Hyderabad, India

- Study of magnetization dynamics in FM, AFM, and Insulator multi-layers with STT
- Set up of Molecular Beam Epitaxy facility
- FPGA based automation and differential pumping for Ultra High Vacuum (UHV)

Research Assistant — Apr 2015 – Jun 2015
Tata Institute of Fundamental Research (TIFR) — Hyderabad, India

- Simulation of magnetic multi-layers with OOMMF

Research Assistant — Jul 2014 – Dec 2014
Indian Institute of Science (IISc) — Bangalore, India

- Characterization of Au nanowires and graphene based gas sensors
- Study of change in resistance noise of sensors due to physisorption of different gases

Graduate Research Assistant — May 2013 – May 2014
Indian Institute of Technology Roorkee — Roorkee, India

- Calculation of photonic band gaps using Finite Difference Time Domain (FDTD)

Conferences and Presentations

Oral presentation at Conference on Magnetism and Magnetic Materials — Nov 2022, USA (Hybrid)

Workshop on Ubermag at SOL-SKYMAG 2022 — Jun 2022, Spain

Oral Presentation at INTERMAG 2020 — May 2020, Virtual

Oral Presentation at DPG Spring Meeting 2019 — Apr 2019, Germany

Honors and Awards

IdEx Fellow (Initiative for Excellence) — Oct 2017 – Mar 2021
University of Strasbourg, Strasbourg, France

INSPIRE Scholarship — Jul 2009 – May 2014
Ministry of Science and Technology, Roorkee, India

Teaching Experience

Co-Supervised three M.Sc. thesis — Jul 2022 – Sep 2022
Imperial College, London, London, UK

Teaching under-privileged girls using flipped classroom technique — Jan 2016 – Jan 2017
Tata Institute of Fundamental Research, Hyderabad, India

Publications

M. Lonsky; M. Lang; S. Holt; **S. A. Pathak**; R. Klause; T. Lo; M. Beg; A. Hoffmann; H. Fangohr, Developing computational skills through simulation based problem-solving in science, *arXiv preprint arXiv:2303.01784* 2023

S. J. R. Holt; M. Lang; J. C. Loudon; T. J. Hicken; D. Cortés-Ortuño; **S. A. Pathak**; M. Beg; H. Fangohr, Towards virtual micromagnetic experiments: mag2exp, *in preparation for submission* 2022, draft available here

S. A. Pathak; R. Hertel, Three-Dimensional Chiral Magnetization Structures in FeGe Nanospheres, *Physical Review B* 2021, 103, 104414

S. A. Pathak; R. Hertel, Geometrically Constrained Skyrmions, *Magnetochemistry* 2021, 7(2), 26

Skills

- Micromagnetic and atomistic simulation studies of magnetic materials
- Implementation of machine learning algorithms in study of magnetic materials
- Software engineering: Version control, unit tests, CI/CD
- Programming skill in Python, C/C++, Rust, Bash, and MATLAB
- Maintenance and setup of High Performance Computation (HPC) clusters
- Epitaxial growth and characterisation of magnetic thin films in ultra-high vacuum

Reference

Prof. Hans Fangohr
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MPSD, CFEL
Hamburg, Germany

Dr. habil. Riccardo Hertel
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