RAJNANDINI SHARMA, Ph.D.
Boston, MA 02135
rsnandiniraj1@gmail.com | +1 (202) 440 6088
Website, LinkedIn, and Google Scholar

RESEARCH INTEREST

NV Magnetometry, Magnonics, Spintronics, Magnetic Materials and Magnetism, Ferrimagnetic Insulator, Garnets, Ferromagnetic Resonance, and Thin Film Deposition.

WORK and RESEARCH EXPERIENCE

Howard University, Washington DC, USA **2024 - Present**

- Postdoctoral fellow at the Department of Physics and Astronomy.
- Identified emergent materials and collaborated to design the projects.
- Micromagnetic simulation studies for real-space magnetic topological features.

Northeastern University, Boston, MA, USA **2024 - Present**

- Visiting Scholar
- Synthesis and characterization of magnetic materials.
- Performed scanning NV magnetometry experiments.
- Collaborating to publish an article in peer-reviewed journals.

Raja Ramanna Center for Advanced Technology, Indore, India **2019**

- Beamline user at BL-3 Soft X-ray Beamline of INDUS-2
- Soft X-ray reflectivity and absorption experiments and exposure to the synchrotron radiation source.
- Performing the experiments and sample preparation.

School of Physics, Devi Ahilya VishwaVidyalaya, Indore, India **2016 - 2018**

- Project Fellow
- Project entitled "Effect of swift heavy ion irradiation (SHI) on structural and magnetic properties of nano-crystalline spinel ferrites."
- Assisted with Ph.D. for experimental data analysis and synthesis.

UGC- DAE Consortium for Scientific Research, Indore, India **2015 - 2016**

- Master's project student under the supervision of Dr. Vasant Sathe
- Thesis entitled "Temperature dependent Raman spectroscopic studies of $LaFeO_3$ and $LaMnO_3$ across magnetic order"
- Synthesizing perovskites with the solid-state method, characterization, and data analysis.

Institute for Plasma Research, Gandhinagar, India **2015**

- Summer intern guided by Mr. Thomas Jinto
- Report entitled "Calibration of polychromator for Thomson scattering using Raman scattering."
- Alignments and calibration of polychromator.

EDUCATION

Indian Institute of Technology (Banaras Hindu University), Varanasi, India **2018 - 2024**

- Ph.D. in Materials Science and Technology with the guidance of Dr. Shrawan Kumar Mishra
- Thesis: "Magnetic resonance properties of all solution-processed Iron Garnet thin films."

Devi Ahilya Vishwa Vidyalaya, Indore, India **2014 - 2016**

- M.Sc. in Physics
- GGPA = 8.16/10 (I Division)

Govt. Holkar Science College, Indore, India **2011 - 2014**

- B.Sc. in Physics, Chemistry, and Mathematics
- *(affiliated to Devi Ahilya Vishwa Vidyalaya, Indore, India)*
- Percentage = 79.97% (I Division) (1st position in Batch)

Madhya Pradesh Board, Indore, India **2011**

- Higher Secondary Examination in Physics, Chemistry, and Mathematics
- Percentage = 86.2% (among 1 percent in the state of M.P., India)

EXPERIMENTAL SKILLS

Sample Preparation:

- Sol-gel-based spin coating.
- Magnetron DC and RF Sputtering
- Ion Beam Sputtering

Characterization:

- Scanning NV magnetometry
- Broadband Ferromagnetic resonance (FMR)
- Atomic Force Microscopy (AFM)
- Magnetic Properties Measurement System (MPMS)
- Spectrometer
- Micro Raman
- X-ray Reflectivity (XRR)
- X-ray diffraction (XRD)
- Field Electron Scanning Electron Microscope (FESEM)
- Micro Raman
- X-ray Photoemission Spectroscopy (XPS)
- Transmission Electron Microscopy (TEM)

COMPUTER SKILLS

Basic Software:

- Microsoft Office
- Origin (graphics software)
- Igor (graphics software)
- LaTeX
- Python

Analytical Software:

- Image J (Scanning Electron Microscopy analysis),
- Gwyddion (Atomic Force Microscopy analysis)
- Parratt32 (X-ray reflectivity analysis)
- Vesta Software (crystal structure analysis)
- CasaXPS (X-ray Photoelectron Spectroscopy analysis)
- XPS Peak 4.1 (X-ray Photoelectron Spectroscopy analysis)
- Full Prof (Rietveld Refinement)
- SRIM (ion irradiation stopping potential and range of matter)

Micromagnetic Software:

- Mumax[3]
- Object Oriented Micromagnetic Framework (OOMMF)

ADDITIONAL SKILLS

Experience in performing data analysis, preparing reports and presentations for projects, and writing scientific publications. Learned to be efficient in time management and able to fulfill tight deadline requirements.

PUBLICATION

1. "Quantum sensing of geometrically altered DMI-induced domain walls in thulium iron Garnets" **R. Sharma**, et al. (Under preparation)
2. "Magneto Crystalline Anisotropy in Multi-Oriented MnSb Thin Films for Multifunctional Device Applications", N. Azam, J. Rable, **R. Sharma**, et al., *APL Electronic Devices* (Accepted).
3. "Interfacial skyrmion in magnetic thin films and its applications", **R. Sharma**, S. K. Mishra, *Journal of Magnetism and Magnetic Materials* 551 (2022) 169107.
4. "Observation of V–V dimers softening and distinct length scales in nanostructured VO_2 thin films", P.K. Ojha*, **R. Sharma*,** R. Hissariya, S. Babu, E. Ketkar, S. Singh, S. Neema, A. Rana, N. Pal, V.G. Sathe, S.K. Mishra, *Journal of Physics and Chemistry of Solids* 163 (2022) 110564.
5. "Antisites disorder mediated magnetization relaxation and polydispersity in La_2NiMnO_6crystallites", R. Hissariya, **R. Sharma**, S.K. Mishra, *Journal of Physics and Chemistry of Solids* 181 (2023) 111549.
6. "Magnetic energy dissipative factors of spin-coated Y3Fe5O12 thin films", **R. Sharma**, P.K. Ojha and S.K. Mishra, *Thin Solid Films* 764 (2023) 139625.
7. "Magnetic ordering in sol-gel-based Tm3Fe5O12 thin films", **R. Sharma**, P.K. Ojha, S. Choudhary and S. K. Mishra, *Materials Letters* 352 (2023) 135154.
8. "Charge ordering at a dielectric gate in itinerant metallic states with low-field memristor properties in VO2 thin films", P. K. Ojha, **R. Sharma**, S. K. Mishra, and S.Ram, *Surfaces and Interfaces* 42 (2023) 103445.
9. "Dynamics of phonons, charge-regulated itinerant VO2 states, and their impacts on the memristor properties of thin VO2 films", P. K. Ojha, **R. Sharma**, V.G. Sathe, S. Ram and S. K. Mishra, *Surfaces and Interfaces* 46 (2024) 104029.
10. "All solution grown epitaxial magnonic crystal of thulium iron garnet thin film", **R. Sharma**, P. K. Ojha, S. Sahoo, R. Roychoudhary, and S. K Mishra (**arXiv:2312.15973**).
11. "The micromagnetic study of stabilizing parameters for the interfacial skyrmions", **R. Sharma**, and S. K. Mishra, *Materials Today: Proceedings* 80 (2023) 1205.
12. "Effect of 120 MeV $^{28}Si^{9+}$ ion irradiation on structural and magnetic properties of $NiFe_2O_4$ and $Ni_{0.5}Zn_{0.5}Fe_2O_4$" **R. Sharma**, S. Raghuvanshi, M. Satalkar, S. N. Kane, T. R. Tatarchuk, *and* F. Mazaleyrat, *AIP Conference Proceedings* 1953 (2018) 030117.

CONFERENCES AND WORKSHOPS

Conference for Graduate Women and Gender Minorities in Physics **2025**
Washington DC, USA

American Physical Society Global Physics Summit (March Meeting) **2025**
Los Ángeles CA, USA
(Poster Presented)

MagIC+ Magnetism, Interactions and Complexity: Innovative ideas on spin wave dynamics and transport properties in low-dimensional materials (MagIC+ 2023) **2023**
Bedlewo, Poland
(Poster presented)

8th International Conference on Nanomaterials for Better Living (NBL 2023) **2023**
Srinagar, Kashmir, India
(Poster presented)

Recent Advancement in Sustainable Materials (GC-RASM 2022) **2022**
Mangalore, Karnataka, India
(Oral presentation)

International Conference on Higher Education Research and Innovation (ICHERI'22) **2022**
(Virtually)

International Conference on Advanced Materials and Mechanical Characterization (ICAMMC) 2021 (Virtually)

The European School on Magnetism 2019 (Experimental Techniques) **2019**
Brno, Czech Republic

International Conference on Functional Nanomaterials **2019**
Department of Physics, IIT (BHU), Varanasi, India
(Poster presented)

2nd International Conference on Condensed Matter and Applied Physics **2017**
Govt. Engineering College, Bikaner, India
(Poster Presented)

4th International Conference on Nano-Structuring by Ion Beam **2017**
Devi Ahilya Vishwavidyalaya, Indore (M.P.), India
(Poster presented)

First Order Phase Transition Workshop **2017**
UGC - DAE CSR Indore, India

M.P. Young Scientist Congress and Associated Events **2017**
Advanced course on **Research Methodology and Scientific Paper Writing**
M.P. Council of Science and Technology, Bhopal, India

ACHIEVEMENTS AND SCHOLARSHIPS

International Travel Grant **2023**
Science and Engineering Research Board
Government of India, New Delhi, India

Best Poster Award **2023**
8th International Conference on Nanomaterials for Better Living (NBL 2023**)**

Student Travel Grant Support **2019**
Indian Institute of Technology (BHU)

INSPIRE Fellowship **2018 - 2023**
Department of Science and Technology, New Delhi, India
(for Doctoral studies)

State Eligibility Test for Assistant Professor **2017**
University Grant Commission, New Delhi
(valid in the state of Madhya Pradesh only)

Project Fellowship **2016 - 2018**
Inter University Accelerator Center, New Delhi, India

Inspire Scholarship for Higher Education **2011 - 2016**
Department of Science and Technology, New Delhi, India
(for Bachelor's and Master's studies)

'C' Certificate **2013**
National Cadet Corps, India

REFERENCES

1) **Prof. Swastik Kar, Ph.D.**
Professor of Physics
Northeastern University, Boston, MA, USA – 02115
Director
Email- s.kar@northeastern.edu

2) **Dr. Sugata Chowdhury, Ph.D.**
Assistant Professor
Department of Physics and Astronomy
Howard University, Washington DC, USA- 20059
Email- sugata.chowdhury@howard.edu

3) **Prof. Arun Bansil, Ph.D.**
University Distinguished Professor in physics
Northeastern University, Boston, MA, USA – 02115
Email- ar.bansil@northeastern.edu