Abhishek Talapatra

Personal Information

Date of Birth:	31 July 1989
Place of Birth:	Bhadreswar, West Bengal, India.
Present Address:	Room No. F213, IIT Hyderabad Boys Hostel Kandi, Sangareddy 502285, Telangana, India.
Permanent Address:	85 Library Road, Sarat Chatterjee Lane Bhadreswar, Hooghly, 712124, West Bengal, India.
Phone:	+91 9433449162, +91 9494826883
email:	ph13p1001@iith.ac.in, talapatra.abhishek@yahoo.in

Affiliation

Aug 2015 onward — **Senior Research Fellow**
Department of Physics
Indian Institute of Technology Hyderabad, India.

Aug 2013-July 2015 — **Junior Research Fellow**
Department of Physics
Indian Institute of Technology Hyderabad, India.

Education

December 2013 — Ph.D. Course Work in Physics
Institute: **Indian Institute of Technology Hyderabad**, India
Subjects: Classical Physics, Quantum Physics,
Magnetism, Experimental Techniques.

2012 — Master in Science in Physics
Institute: **Presidency College, Kolkata**, India
University: **University of Calcutta**
Specialization: Electronics, Elective: Microwave Communication.

2010 — Bachelor in Science with Physics Honours
Institute: **Serampore College**, India
University: **University of Calcutta**
Subjects: Physics (Honours), Mathematics, Electronics.

2007 — Higher Secondary Examination (12th Class)
Institute: **Kanailal Vidyamandir**
Subjects: Physics, Chemistry, Mathematics, Biology.

2005 — Secondary Examination (10th Class)
Institute: **Kanailal Vidyamandir**
Subjects: Languages, Mathematics, Sciences, History, Geography.

Examinations and Fellowship

- Qualified **Graduate Aptitude Test in Engineering (GATE)** 2013 in Physics.

- Qualified **National Eligibility Test (NET)**, December 2016 with *JRF-CSIR* in Physical Sciences.
- **Doctoral fellowship** from *Ministry of Human Resource and Development (MHRD)*, India for the period of 5 years, started from August 2013.

Research Interest and Expertise

- Growth of magnetic thin film and multilayer by magnetron sputtering and electron beam evaporation.
- Growth of magnetic alloy nanoparticles by chemical method.
- Self-assembled nano-structure and its modification by local (focused ion beam, Laser) and global (rapid thermal processing) perturbations.
- High resolution, noise free imaging with magnetic force microscopy (MFM) and magneto-optic Kerr effect (MOKE) microscopy.
- Magnetic skyrmion in multilayer and its manipulation with current and magnetic field.
- High density data storage with magnetic multilayer, having perpendicular magnetic anisotropy.
- Ultrafast demagnetization and slower precessional dynamics towards remagnetization.
- Understanding perpendicular exchange bias with MFM at low temperature and high magnetic field.
- Data analysis of magnetic and structural characterizations with SQUID, VSM, XRD, FE-SEM and TEM.
- Finite difference method based micromagnetic simulations.
- Atomistic simulation for thin films and heterostructure.

Current Projects

- Manipulation of magnetism with external perturbations such as, ultrafast Laser, focused ion-beam and rapid thermal processing.
- Non-collinear spin textures in asymmetric anti-ferromagnetic and ferromagnetic multilayer nanostructures with the Dzyaloshinskii-Moriya interaction.
- Laser induced ultrafast demagnetization and precessional dynamics in rare-earth transition-metal alloys.
- Depth-resolved structural studies by cross-sectional TEM and Rutherford Backscattered Spectrometry.
- Investigation of magnetic domain and domain wall and their dynamics in perpendicular magnetic anisotropy materials.
- Magnetic singularities and its dependence on material systems.
- Micromagnetic calculations of variation of switching field in high density patterned media ($\sim$1 Tb per inch^2).
- Ferrimagnetic materials (single layer, bilayer and multilayer), domain structure, tilted anisotropy, perpendicular exchange bias.

Future Interest

- Stabilization of magnetic skyrmion at room temperature; material fabrication and current induced manipulation towards ultra-high density data storage.
- Magnetization dynamics in spin-torque devices and exchange spring systems.
- Ultrafast demagnetization and the slower remagnetization with precessional dynamics (time scale: fs to ns).
- X-ray imaging as local probe to study the effect of external perturbations.
- Element specific, depth resolved studies in thin film and multilayer with X-ray and Neutron.
- Magneto-electric coupling and transport properties.
- Multi-scale modeling (different length and time scales).

Publications

International Journal

1. A. Talapatra and J. Mohanty, *Laser induced local modification of magnetic domain in Co/Pt multilayer*, Journal of Magnetism and Magnetic Materials **418**, 224 (2016).
   DOI: 10.1016/j.jmmm.2016.02.051.
2. A. Talapatra and J. Mohanty, *Role of patterning induced defect on the switching field of magnetic nanostructure*, Applied Physics A **122**, 807 (2016).
   DOI: 10.1007/s00339-016-0341-z.
3. A. Talapatra and J. Mohanty, *Anisotropy induced switching field distribution in high density patterned media*, Spin **7(2)**, 1750005 (2017).
   DOI: 10.1142/S2010324717500059.
4. A. Talapatra, J. Arout Chelvane and J. Mohanty, *Tuning magnetic microstructure in Gd-Fe thin films: experiment and simulation*, Journal of Magnetism and Magnetic Materials **448**, 360 (2018).
   DOI: 10.1016/j.jmmm.2017.07.092.
5. A. Talapatra,K. Umadevi, J. Arout Chelvane, J. Mohanty and V. Jayalakshmi, *Magnetic domains in Tb-Fe-Co thin films under anisotropy tilt*, Journal of Magnetism and Magnetic Materials 2018, in-press.
6. P. Saravanan, A. Talapatra, J. Mohanty, Jen-Hwa Hsu and S. V. Kamat, *Role of Ta-spacer layer on tuning the tilt angle magnetic anisotropy of $L1_1$ CoPt/Ta/NiFe exchange springs*, Journal of Magnetism and Magnetic Materials **432**, 82 (2017).
   DOI: 10.1016/j.jmmm.2017.01.072.
7. K. Umadevi, A. Talapatra, J. Arout Chelvale, Mithun Palit, J. Mohanty and V. Jayalakshmi, *Magnetic anisotropy and microscopy studies in magnetostrictive Tb-(Fe,Co) thin films*, Journal of Applied Physics **122**, 065108 (2017).
   DOI: 10.1063/1.4998451.
8. P. Saravanan, A. Talapatra, J. Mohanty, B. Sellarajan and Jen-Hwa Hsu, *Study on the domain structure and tunable spin orientation in $L1_1$-CoPt/NiFe exchange springs with Ta spacer*, Journal of Magnetism and Magnetic Materials **448**, 316 (2018).
   DOI: 10.1016/j.jmmm.2017.08.003.
9. V. Madhav Kumar, A. Srinivas, A. Talapatra, Saket Asthana, J. Mohanty and S. V. Kamat, *Effect of deposition temperature on structural, microstructural and magnetic properties of*

$CoFe_2O_4$ *thin films deposited by pulsed laser deposition*, Journal of Materials Science: Materials in Electronics **28**, 446 (2017).
DOI: 10.1007/s10854-016-5541-y.

10. K. Sai Maneesh, J. Arout Chelvane, A. Talapatra, Himalay Basumatary, J. Mohanty and S. V. Kamat, *Spin reorientations in Tb-Fe films grown on polyimide substrates*, Journal of Magnetism and Magnetic Materials **448**, 31 (2018).
DOI: 10.1016/j.jmmm.2017.03.057.

11. A. Talapatra, J. Arout Chelvane, B. Satpati, S. Kumar and J. Mohanty, *Microscopic investigation of easy axis tuning in Gd-Fe thin films*, (Under review),
https://arxiv.org/pdf/1702.02987

Conference Proceedings

1. A. Talapatra and J. Mohanty, *Magnetic domain and domain wall in Co/Pt multilayer*, AIP Conference Proceedings **1731**, 130027 (2016).
DOI: 10.1063/1.4948133.

2. A. Talapatra, J. Arout Chelvane and J. Mohanty, *Microscopic understanding of domain formation in Gd-Fe thin films*, AIP Conference Proceedings, **1832**, 130044 (2017).
DOI: 10.1063/1.4980764.

Conference Participation

- *A* **School** *on Basics of Magnetism and Investigations of Magnetic Properties of Materials by Synchrotron Radiation*, March 24-28, 2014 at RRCAT Indore, India.
- **Poster presentation** at *Indo-Japan Workshop on Magnetism at Nanoscale*, January 9-11, 2015 at NISER Bhubaneswar, India.
- **School** *on Neutron as Probe in Condensed Matter*, January 25-30, 2015 at BARC Mumbai, India.
- **Poster presentation** at *DAE-BRNS Theme Meeting on Ultrafast Sciences*, November 21-23, 2015 at S. N. Bose National Centre for Basic Sciences, Kolkata, India.
- **Poster presentation** at *International Conference on Magnetic Materials and Applications*, December 2-4, 2015 at Vellore Institute of Technology, Vellore, India.
- **Poster presentation** at *DAE Solid State Physics Symposium*, December 21-26, 2015 at Amity University, Noida, India.
- **Poster presentation** at *Silver Jubilee Conference on Study of Matter using Intense Radiation Sources and Under Extreme Conditions*, November 3-6, 2016 at UGC-DAE Consortium for Scientific Research Indore, India.
- **Oral and poster presentation** at *International Conference of Young Researchers on Advanced Materials (IUMRS-ICYRAM 2016)*, December 11-15, 2016 at IISC Bangalore, India.
- **Poster presentation** at *DAE Solid State Physics Symposium*, December 26-30, 2016 at KIIT University, Bhubaneswar, India.
- **Oral presentation** at *International Conference on Magnetic Materials and Applications*, February 1-3, 2017 at Leonia International Center for Exhibitions and Conventions, Hyderabad, India.
- **Oral and poster presentation** at *Research Scholars Day 2017*, February 7, 2017 at IIT Hyderabad, India.

- **Poster presentation** at *DAE-BRNS Symposium on Two Decades of Ion Beam Analysis at 3 MV Tandetron*, March 23-24, 2017 at NCCCM, BARC, Hyderabad, India.
- **Oral presentation** at *62nd Annual Conference on Magnetism and Magnetic Materials (MMM) 2017*, November 6-10, 2017 at Pittsburgh, USA.

Awards

- **Best poster award** at *DAE-BRNS Theme Meeting on Ultrafast Sciences*, November 21-23, 2015 at S. N. Bose National Centre for Basic Sciences, Kolkata, India.
- **Best poster award** at *International Conference on Magnetic Materials and Applications*, December 2-4, 2015 at Vellore Institute of Technology, Vellore, India.
- **Poster presentation award** at *Silver Jubilee Conference on Study of Matter using Intense Radiation Sources and Under Extreme Conditions*, 3-6 November, 2016 at UGC-DAE Consortium for Scientific Research Indore, India.
- **Best poster award** at *International Conference of Young Researchers on Advanced Materials (IUMRS-ICYRAM 2016)*, December 11-15, 2016 at IISC Bangalore, India.
- **Best oral presentation award** at *Research Scholar Day 2017*, February 7, 2017 at IIT Hyderabad, India.
- **Best poster award** at *DAE-BRNS Symposium on Two Decades of Ion Beam Analysis at 3 MV Tandetron*, March 23-24, 2017 at NCCCM, BARC, Hyderabad, India.
- **Research excellence award 2016** at IIT Hyderabad, India.
- **Travel award** for attending *62nd Annual Conference on Magnetism and Magnetic Materials (MMM) 2017*, November 6-10, 2017 at Pittsburgh, USA.

Experience

- Carrying out experiments at different national facilities such as, Synchrotron X-rays at RRCAT, Low energy ion-beam related experiments at IUAC New Delhi, High field low temperature magnetic force microscopy at UGC-DAE CSR Indore, Rutherford Backscattered Spectrometry at NCCCM-BARC Hyderabad.
- Writing research proposal to different national and international funding agencies under the supervision of Ph. D. supervisor.
- Teaching assistant in B. Tech Physics Lab at IIT Hyderabad.
- Teaching assistant in Electromagnetic Theory for B. Tech students in 1st semester, 2014.
- Conducting tutorial classes and examinations for B. Tech and M. Sc students.
- Student incharge of Atomic and Magnetic Force Microscopy from Department of Physics.
- Student incharge of 3D Optical Profiler from Department of Physics.
- Two semester (August 2012- May 2013) M. Tech course work in School of Material Science and Engineering at Bengal Engineering and Science University Shibpur (presently, IIEST Shibpur).

Aim

- To be scientist or academician to continue research in *Condensed Matter Physics*.
- Research from lab scale to industry scale.
- Growth of high quality nanostructured materials.

- Functional, structural and transport properties of materials.
- Microscopy and modeling.
- Carrying out research as post doctoral fellow at international labs of repute.

Computer Skill

Programming:	FORTRAN, C, MATLAB.
Operating System:	WINDOWS, UBUNTU.
Image Editing:	COREL DRAW, INKSCAPE.
Image Analysis:	IMAGE J, GWYDDION.
Graphing:	ORIGIN, MATLAB.
Text Processor:	MS WORD, LATEX.

Languages

BENGALI:	Mother tongue.
ENGLISH:	Fluent.
HINDI:	Fluent.

Qualities

- Motivated towards doing high quality research work.
- Proper in time management.
- Capable of handling multiple assignments.
- Good at group activities.

Interests and Activities

- Economy, Polity, Mathematics.
- Open source softwares, Photography, Image processing.
- Yoga, Exercise, Recitation, Extempore, Debate.
- Watching Cricket, Cooking, Travelling.

Academic/Professional References

1. **Dr. Jyoti Ranjan Mohanty** (Ph. D. Supervisor)
   Assistant Professor, Department of Physics
   Indian Institute of Technology Hyderabad
   Kandi, Sangareddy, Pin: 502285, Telangana, India.
   E-mail: jmohanty@iith.ac.in
   Contact: 040-2301-7073 (Office), 08985297072 (Mobile).
2. **Dr. J. Arout Chelvane** (Collaborator)
   Scientist-E, Advanced Magnetics Group
   Defence Metallurgical Research Laboratory Hyderabad
   Kanchanbag, Pin: 500058, Telangana, India.
   E-mail: aroutchelvane@gmail.com
   Contact: 040-2458-6677 (Office), 09490166724 (Mobile).

3. **Dr. Ashok Kumar Pandey** (Member of Doctoral Committee)
   Associate Professor, Department of Mechanical and Aerospace Engineering
   Indian Institute of Technology Hyderabad
   Kandi, Sangareddy, Pin: 502285, Telangana, India.
   Email: ashok@iith.ac.in
   Contact: 040-2301-6085 (Office), 09494060728 (Mobile).