

Ranjan Kumar Barik

PERSONAL DATA

AFFILIATION: Assistant professor (OES-I)
Department of Physics
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RESEARCHGATE: <https://www.researchgate.net/profile/Ranjan-Barik-4>

GITHUB: <https://github.com/rkb12>



RESEARCH INTEREST

Density functional theory (DFT), Exploration of new topological materials, Modern theory of polarization and Berry phase, Construction of maximally localized Wannier function, Quantum anomalous Hall effect, Topological insulator, Nodal line semimetals, Dirac semimetals, Weyl semimetals, Triple point metals, Rashba materials, Valley manipulation and topology. Study of magnetic anisotropy, Friction in 2D materials, and Machine learning (ML).

FUTURE PLANS

Designing novel materials, Deep-learning, Topological Quantum-computing and Superconductivity.

EDUCATION

- FEBRUARY 2022-AUGUST 2023 Post Doctoral Fellow
Department of Physics, University of South Florida,
Interdisciplinary Science, ISA 5114, Tampa, Florida, USA
Advisor: Prof. Lilia M. Woods (Department of Physics)
Group: <https://www.amd-woods-group.com/team>
- AUG 2016-OCTOBER 2021 PhD in Science
Materials Research Centre, Indian Institute of Science,
Bangalore, India
Thesis: Exploring Topological Phases of Matter using DFT and ML Approaches
Advisor: Prof. Abhishek Kumar Singh (Materials Research Centre)
Group: <https://thsim.mrc.iisc.ac.in/alumni>
- AUGUST 2011 - MAY 2013 Master of Science in APPLIED PHYSICS AND BALLISTICS
Fakir Mohan University, Balasore, India
- AUGUST 2008 - MAY 2011 Bachelor of Science in PHYSICS (HONS)
Fakir Mohan University, Balasore, India

Conferences:

1. *Poster Present*, “Antiperovskites Materials: a Playground for Magnetic and Topologically Nontrivial Effects”, at APS March Meeting , LAS VEGAS, **USA**, (March, 2023)
2. *Oral Present*, “Statistical Modeling of Frictional Properties: a Machine Learning Approach”, at APS March Meeting, LAS VEGAS, **USA**, (March, 2023)

Internship:

1. *Internship*, “Study of Rashba effect in 2D materials”, at Material Genome Institute, Shanghai University, **Shanghai, China**, (4th November to 5th December, 2019)

Workshop/Projects:

1. *Workshop*, “Computational methodologies across length scales” at Bhaba Atomic Research Centre” **Mumbai, India**, (August 28 to September 09, 2017)
2. *Project*, “Operational Amplifier and its applications to Filters and Oscillators using PSPICE” , at Integrated Test Range (ITR), **Odisha, India** (May 2013)
3. *Project*, “Study of the properties of CsI (TI) and Si (SB) detectors and measurement of thickness of a thin foil”, Variable Energy Cyclotron Centre, **Kolkata, India**, (May to June 2012)

TEACHING EXPERIENCE

Teaching to B.Sc. students AUGUST 2023 to Present	CORE AND DSE COURSES, COMPUTER PROGRAMMING ETC.
Teaching assistant JAN-MAY 2019	MR 308: COMPUTATIONAL MODELING OF MATERIALS. Course instructor: Prof. Abhishek Kumar Singh Materials Research Centre

COMPUTATIONAL SKILLS

Programming language:	PYTHON, MATLAB, C, FORTRAN
Applications:	L ^A T _E X, OpenOffice.org, Xmgrace, Gnuplot, Microsoft Office
Utilities:	BASH scripting, awk, sed
Operating systems:	Linux (Ubuntu, CentOS), Windows (XP, Vista, 7, 8)
Software packages:	VASP, Quantum ESPRESSO, WIEN-2K, OCTOPUS (TDDFT), WANNIER90, WANNIER-TOOLS, PHONOPY, CASINO, TDEP, BOLTZTRAP, SHENGBTE, VESTA, VMD, CRYSTALMAKER, COHP, VASPKIT

SCHOLARSHIPS AND AWARDS

1. Qualified Graduate Aptitude Test in Engineering (GATE-2016, Rank-120, and score 650)
2. Qualified Joint Entrance Screening Test (JEST-2016, Rank-184, and Percentile 96.63)
3. Qualified Joint CSIR-UGC Test for Junior Research Fellowship (NET-2016)

PUBLICATIONS

Peer-reviewed journals:

1. **Ranjan Kumar Barik** and Lilia M. Woods “*Frictional Properties of Two-Dimensional Materials: Data-Driven Machine Learning Predictive Modeling*” *ACS Appl. Mater. Interfaces* **16**, **30**, 40149–40159 (2024)
2. Partha Kumbhakar, Subhendu Mishra, Pathik Kumbhakar, **Ranjan Kumar Barik**, Chandra Sekhar Tiwary, Abhishek Kumar Singh “*Strain-Induced Tribocatalytic Activity of 2D ZnO Quantum Dots*” *J. Phys. Chem. C* **128**, **25**, 10733–10741 (2024)
3. **Ranjan Kumar Barik** and Lilia M. Woods “*High throughput calculations for a dataset of bilayer materials*” *Sci. Data* **10**, 232 (2023)
4. Diem Thi-Xuan Dang, **Ranjan Kumar Barik**, Manh-Huong Phan, and Lilia M. Woods “*Enhanced Magnetism in Heterostructures with Transition-Metal Dichalcogenide Monolayers*” *J. Phys. Chem. Lett.* **13**, **38**, 8879–8887 (2022)
5. **Ranjan Kumar Barik** and Abhishek Kumar Singh “*Accelerated Discovery of the Valley-Polarized Quantum Anomalous Hall Effect in MXenes*” *Chem. Mater.* **33**, **16**, 6311–6317 (2021)
6. **Ranjan Kumar Barik**, Ritesh Kumar and Abhishek Kumar Singh “*Topological Phases in Hydrogenated Group 13 Monolayers*” *J. Phys. Chem. C* **123**, **42**, 25985–25990 (2019)
7. **Ranjan Kumar Barik**, Ravindra Shinde and Abhishek Kumar Singh “*Multiple Triple-Point Fermions in Heusler Compounds*” *J. Phys. Condens. Matter* **30**, 375702 (2018)

REVIEWER OF THE PEER-REVIEWED JOURNALS

1. **Physical Review B**: Scientific journal, published by the American Physical Society, More than 10 publications are reviewed.
2. **Physical Review B Letter**: Scientific journal, published by the American Physical Society.
3. **npj Computational Materials-Nature**: An open access journal from Nature Research.
4. **Scientific Reports**: A peer-reviewed open-access scientific mega journal published by Nature Portfolio.
5. **Journal of the American Chemical Society**: A peer-reviewed scientific journal by the American Chemical Society.