Dr. Sanjay Sharma

Research Associate
IIT Bombay

Date of Birth: March 02, 1994

Magnetic Materials Lab,
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S. Sharma

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Research Interests

- Computational Physics
- Density Functional Theory
- Ab-initio calculations for materials
- Thermoelectric generators
- Theory of Magnetism
- Magneto-calorics
- Magnetism in Heusler alloys
- Magnetism in Weyl Semi-metals

Technical Skills

Programming:

- C, C++
- FORTRAN, MATLAB
- Python
- Bash scripting

Calculation Tools:

- Quantum Espresso
- VASP, Wien2k

Data Analysis Tools:

- Origin, FullProf
- MS Excel, Gnuplot

Writing & Editing Tools:

- Inkscape, Photoscape
- MS Word, Powerpoint
- LaTex

Education

Postgraduate Studies

2018 – 2023 **Ph.D. in Condensed Matter Physics** — IIIT-A, India
Title: Experimental and Theoretical Study of Magnetothermal and Magnetotransport Properties in Rare-Earth-Based Intermetallic Compounds.
Supervisor: Dr. Pramod Kumar
Grade: CGPA: 9.11

Magnetism | Magnetocalorics | Rare-earths | Intermetallics | Heusler alloys | Density Functional Theory

2015 – 2017 **M.Sc. in Physics (Computational Physics)** — CUPB, Punjab, India
Title: Transportation in Quantum Dots: Basic Need of a Smart World
Supervisor: Dr. Prakash Parida
Grade: CGPA: 7.24

Nano-junctions | Model Hamiltonian | Coulomb Blockade | Pauli Blockade | Quantum Transportation

Undergraduate Study

2012 – 2015 **B.Sc. in Physics Honours** — University of Delhi, India
Percentage: 77.03%

Awards and Scholarships

March 2018	Qualified Graduate Aptitude Test in Engineering (GATE) for Physics	MHRD
July 2018	Awarded Junior Research Fellowship for Ph.D.	MHRD
Nov 2020	Awarded Senior Research Fellowship for Ph.D.	MHRD

Experimental Skill-set

- Expert in bulk sample preparation by using **Vacuum Arc Melting**.
- Adept at magnetic samples characterization using **PPMS (Quantum Design)** and their data analysis.
- Hands-on experience in **XRD characterization** and data analysis.
- An adequate experience in **Hall measurements** (with LakeShore-8400 series) and data analysis.
- Well experienced in Thin-film deposition using **RF/DC Sputtering** and **Thermal Evaporation technique**.

Teaching Experience

2018–2022 **TRA Assignments I, II and III** — IIIT Allahabad
Role: Teaching Assistant
Credits Earned: 12
Courses taught: Engineering Physics, General Physics Lab

Short Intro

Dr. Sanjay completed his Ph.D. in July 2023. Currently, he is a Research Associate at IIT Bombay and is working on novel topological materials. He is also looking for effective teaching and research positions focusing on theoretical and experimental analysis of various magnetic materials. He is much interested to use DFT and first principle investigations to reveal the magic behind the physics of such compounds. The materials in the considerations are Heusler alloys, Weyl semi-metals and topological materials. From a personal view, Sanjay is a bit extrovert who relishes conversing with people and discussing things going on around the globe. His avidness to be a linguist pushes him to do so. He is a movie buff and prefers watching movies from suspense, thriller, romance, sci-fi, and horror genres. For the "me time" on weekends or holidays, priorities are novels and travelling to new places. Enjoying music, running, and playing badminton are blended into his daily routines.

Competencies

- Resilient working attitude
- Diligent Researcher
- A quick learner
- Inquisitive Nature
- Problem solving aptitude
- Group leading capabilities
- Project Management abilities
- Hard work and punctuality

Languages

Hindi (Mother Tongue)

English (Professional Proficiency)

Punjabi (Native)

Profiles

Conferences, Schools and Workshops

Oral Presentation

19-20 Feb. 2021 — **International Conference** — Online Mode
on **Technological Advancements in Materials Science and Manufacturing** organized by Mechanical Engineering Department, Graphic Era University, Dehradun, Uttarakhand, India.
Title: XPS analysis of $Gd_5Ge_2Si_2$ and its Co-substituted alloy.

Poster Presentation

20-22 Feb. 2020 — **International Conference** — Noida, India
on **Advanced Materials and Nanotechnology (AMN-2022)** organized by Department of Physics and Material Science and Engineering, Jaypee Institute of Information Technology, Noida, India.
Title: A comparative study on magnetocaloric effect in $NdRu_2Si_2$ and $NdRu_2Ge_2$.

10-14 Jan. 2022 — **15th Joint MMM-Intermag Conference** — Online Mode
based in New Orleans, LA, USA.
Title: Modifications in the magnetocaloric effect owing to composition changes in $Gd_2In_{1-x}Ge_x(0 \leq x \leq 0.2)$ system of compounds.

Attended

14-20 Jan. 2019 — **National Workshop** — Himachal Pradesh, India
on **In-Silico approach for modelling new materials: Methodology & Applications** organized by Department of Physics and Astronomical Science, Central University of Himachal Pradesh, India.

13-15 Oct. 2019 — **XXXIV Annual IAPT Convention** — Prayagraj, India
on **Recent Advances & Innovations in Physics Teaching & Research** organized by Department of Applied Sciences, IIIT Allahabad, India.

23-25 Feb. 2021 — **20th International Workshop** — Online Mode
on **Computational Physics and Materials Science: Total Energy and Force Methods** organized by the Abdus Salam International Centre for Theoretical Physics, Italy.

6-17 Sept. 2021 — **The European School on Magnetism 2021** — Online Mode
:from fundamental properties of matter to magnetic materials and applications organized by the European Magnetism Association.

References

Ref. 1 — **Dr. Pramod Kumar** — IIIT Allahabad, India
Associate Professor, Department of Applied Sciences
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Ref. 2 — **Dr. Prakash Parida** — IIT Patna, India
Assistant Professor, Department of Physics
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Ref. 3 — **Dr. Upendra Kumar** — IIIT Allahabad, India
Assistant Professor, Department of Applied Sciences
upendrakumar@iiita.ac.in — +91-9936206263

PCCP | Intermetallics | AIP Advances | JMChemC | MTC | Magnetism | Density functional theory | Topological materials | Heusler alloys | Heterostructures

Publications

Journals

- **Anomalous Magnetic Properties in $LaFe_{11.5}Al_{1.5}$**
  Sanjay Sharma, F. Ahmad, A. Singh, A. K. Patel, P. Kumar
  Physical Chemistry Chemical Physics *January 2020*

- **Critical analysis of chemical and hydrostatic pressure-induced $Gd_5Si_2Ge_2$ alloy**
  Sanjay Sharma, A. K. Patel, P. Kumar
  Materials Today Communications *February 2021*

- **Modifications in the magnetocaloric effect owing to composition changes in $Gd_2In_{1-x}Ge_x$ $(0 \leq x \leq 0.2)$ system of compounds**
  Sanjay Sharma, P. Kumar
  AIP Advances *March 2022*

- **Effect of Ni substitution on the structural, magnetic, and thermodynamic properties in $Gd_{2-x}Ni_xIn$ $(0 \leq x \leq 1)$ intermetallic compounds: An experimental and theoretical study**
  Sanjay Sharma, S. Singh, A. K. Patel, S. K. Gupta, P. N. Gajjar, P. Kumar
  Intermetallics *October 2022*

- **Bi_2Te_2Se and Sb_2Te_3 heterostructure based photodetector with high responsivity and broadband photoresponse: Experimental and theoretical analysis**
  S. K. Verma, **Sanjay Sharma**, G. K. Maurya, V. Gautam, R. Singh, A. Singh, K. Kandpal, P. Kumar , A. Kumar, C. Wiemer
  Physical Chemistry Chemical Physics *September 2023*

- **Strain induced photocurrent enhancement in thin films of topological insulators (Bi_2Te_3)**
  A. Pandey, **Sanjay Sharma**, A. Gangwar, M. Kaur, P. Singh, S. Husale
  Journal of Materials Chemistry C *September 2023*

- **Bulk States Induced Photo-Current in Topological Insulating Materials ($n - Bi_2Se_3/p - Si$) Heterojunction Devices for Highly Responsive Photodetectors**
  V. Gautam, S. Gautam, **Sanjay Sharma**, S. K. Verma, G. K. Maurya, S. Kushvaha, P. Kumar
  Nanoscale Advances (Under Review)

- **Understanding the mysterious nature of *Sb* substitution on structural, magnetic and transport properties in $FeMnSn_{1-x}Sb_x$ $(0 \leq x \leq 0.5)$: An experimental and theoretical study**
  Sanjay Sharma, A. K. Patel, P. Kumar
  Under Preparation

Conference Proceedings

- **A comparative study on magnetocaloric effect in $NdRu_2Si_2$ and $NdRu_2Ge_2$**
  Sanjay Sharma, R. Singh, G. K. Maurya, F. Ahmad, A. Singh, A. Tiwari, P. Kumar
  Materials Today: Proceedings *February 2020*

- **XPS analysis of $Gd_5Ge_2Si_2$ and its Co-substituted alloy**
  Sanjay Sharma, P. Kumar
  Materials Today: Proceedings *February 2021*

Book Chapters

- **Inverse magneto-calorific effect in single crystal of $Ca_3Ru_3O_7$**
  P. Kumar, R. Singh, F. Ahmad, **Sanjay Sharma**, A. Singh, R. Kumar
  Recent Advances & Innovations in Physics Teaching & Research: Proceedings of the 34th IAPT Convention 2019
  1-4 **ISBN**:978-620-0-78765-1 **Publisher:** Lambert Academic Publishing

September 21, 2023

Dr. Sanjay Sharma