

Dr. P. Rambabu

M.Sc. (Univ.of.Hyd.), M.Tech. (IIT Delhi), Ph.D. (IIT Hyderabad)

Associate Professor

Institution: Department of Pure and Applied Physics

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UG/PG Teaching experience: 13+ years

Projects/Consultancy:

1. Funding Agency: **DST-SERB, Government of India (#EEQ/2023/000179)**

Title of The Project: **Exploring novel topological phases in through first principles calculations**

Total Grant: **36.14 Lakhs**

Duration: 3years (**Jan2024 onwards**)

2. Funding Agency: **DST-SERB, Government of India (#CRG/2023/006003)**

Title of The Project: **Energy Harvesting in through First Principles Calculations**

Total Grant: **30.94 Lakhs**

Duration: 3years (**March2024 onwards**)

Research Guidance:

1. Guiding 4 Ph.D. students

2. Guided 24 M.Sc. students for their dissertations.

Research Interests: Spintronics and magnetism, topological materials, thermoelectric materials and superconductivity etc. using Density Functional Theory (DFT) simulations.

Skills:

1. Work experience with ab-initio packages VASP, Wien2k, Quantum espresso, QuantumATK, SPRKKR, phonopy, phono3py etc. for exploring electronic, magnetic, optical, phonon and many other properties.
2. wannier90 and wannier_tools packages for exploring topological properties.
3. Visualization tools such as VESTA, xcrysden, v_sim, p4vasp etc.
4. Python, Fortran 90 and MATLAB utilization for numerical calculations, for data analysis and organization.
5. Experience on handling and mainatanance of clusters at IIT Hyderabad, IISER Kolkata etc.
- 6.

Academic Qualification:

Degree	Year	Subject	University/Institution	% of marks
Ph.D.	2023	Physics	IIT Hyderabad	CGPA 8.9/10 in course work
M. Tech.	2007-2009	Solid State Materials	IIT Delhi	CGPA 7.47/10
M. Sc.	2005-2007	Physics	University of Hyderabad, India	CGPA 8.3/10
B. Sc.	2002-2005	Physics, Mathematics,	Kakatiya University, India	89.55%

Higher Secondary (10+ 2)	2000-2002	Computer Science Physics, Math, Chemistry	Board of Intermediate Education, Andhra Pradesh	90.30%
High School (Class X)	1999-2000	Mathematics, General Science, Social Sciences	SSC Board, Andhra Pradesh	80.83

Thesis title: “First Principles Calculations of intermetallic Heusler and A-15 compounds”

Supervisor: Prof. V. Kanchana, Department of Physics, Indian Institute of Technology Hyderabad, Telangana, India.

Work experience:

S.No.	Positions held	Name of the Institute	From	To
1	Associate Professor	Guru Ghasidas University, Bilaspur	01.07.2024	till date
2	Assistant Professor	Guru Ghasidas University, Bilaspur	17.08.2011	01.07.2024

Professional Recognition/Award/Fellowships:

S.No.	Name of Award	Awarding Agency	Year
1	CSIR-UGC-JRF-NET (Physical Sciences)	CSIR-UGC	December, 2006
2	GATE (Physics)	MHRD, Government of India	February, 2007

Publications (List of papers published in SCI Journals, in year wise descending order).

1. Sanand Kumar Pradhan, Sharadnarayan Pradhan, Priyanath Mal, **P. Rambabu**, Archana Lakhani, Bipul Das, Bheema Lingam Chittari, Rajib Mondal, V. K. Malik, G. R. Turpu, and Pradip Das. “Dirac nodal line behavior in a Zintl-phase CaZn_2Sb_2 single crystal” *Phys. Rev. B* 111, 195115 (2025).
2. Ripan Pradhan, Monika Rana, Anurodh Sharma, Srinivasa Rao Pathipati, G R Turpu, Pradip Das, Bheema Lingam Chittari and P Rambabu. “Ab-initio study of anomalous Hall and Nernst effects in equiatomic quaternary heusler alloy CoFeVGe .” **Phys. Scr.** 100 (2025) 035947.
3. Neha, Shrikanti Kavita, Anshu Andola, Ravi R. Pandey, Rakesh K. Pandey, G. Padmaja, **P. Rambabu**, Pradip Das, Iqra Rabani, G. R. Turpu. “rGO and $\text{g-C}_3\text{N}_4$ as synergistic additives in SnS_2 - MoS_2 hybrid nanocomposites for photocatalytic and electrochemical

- applications: a detailed study.” **Emergent Materials** (2024): 1-15.
4. Sharadnarayan Pradhan, Sanand Kumar Pradhan, Priyanath Mal, **P. Rambabu**, Archana Lakhani, Bipul Das, Bheema Lingam Chittari, G. R. Turpu, and Pradip Das. “Topological nodal line features in NiSe semimetal: Insights from electronic transport and density functional theory studies.” **Phys. Rev. B.** 110 (2024) 195153
 5. Sanand Kumar Pradhan, Sharadnarayan Pradhan, Priyanath Mal, **P. Rambabu**, Archana Lakhani , Bipul Das, Bheema Lingam Chittari, G R Turpu and Pradip Das. “Endless Dirac nodal lines and high mobility in kagome semimetal $\text{Ni}_3\text{In}_2\text{Se}_2$: a theoretical and experimental study.” **J. Phys.: Condens. Matter** 36 (2024) 445601
 6. Neha, Anshu Andola, Ravi R Pandey, Rakesh K Pandey, **P. Rambabu**, Pradip Das, Iqra Rabani, GR Turpu. “Studies into the Synergy Between MoS_2 -rGO-gC₃N₄ for Photocatalytic and Supercapacitor Applications.” **Journal of Electronic Materials** <https://doi.org/10.1007/s11664-024-11258-8>
 7. Neha, Young Soo Seo, Sobia Nisar, R. Vijaya Kumar, **P. Rambabu**, Chandra S. Perugu, S. Banerjee, Pradip Das, Iqra Raban and G. R. Turpu. “Photocatalytic Drug Degradation and Supercapacitor Applications of FeVO_4 and rGO- FeVO_4 Nanocomposite.” **ChemNanoMat** e202400106 . doi.org/10.1002/cnma.202400106
 8. Sanand Kumar Pradhan, Priyanath Mal, Sharadnarayan Pradhan, Archana Lakhani, Dinesh Kumar, Bipul Das, Bheema Lingam Chittari, **P. Rambabu**, G. R. Turpu, and Pradip Das. “Investigation of magnetotransport properties of topological surface states in SnBi_4Te_7 single crystal.” **Journal of Materials Science: Materials in Electronics** 35 (2024) 1-11.
 9. Sanand Kumar Pradhan, Priyanath Mal, Sharadnarayan Pradhan, Archana Lakhani, Bipul Das, **P. Rambabu**, G R Turpu and Pradip Das. “Structural and electronic transport properties of Zn- and Ga-doped $\text{Bi}_{2-x}\text{Sb}_x\text{Te}_{3-y}\text{Se}_y$ topological insulator single crystals.” **J. Phys.: Condens. Matter** 36 (2024) 315702.
 10. **P. Rambabu**, Anusree C.V. , M. Manivel Raja, V. Kanchana. "Anomalous transverse effects in nodal line compounds Co_2TaX (X= Al, Ga)." **Journal of Magnetism and Magnetic Materials** 562 (2022): 169766.
 11. **P. Rambabu**, Anusree C.V. , M. Manivel Raja, V. Kanchana. "Anomalous Hall and Nernst Conductivities in Co_2NbGa : A first principles study." **Journal of Magnetism and Magnetic Materials** 538 (2021): 168303.
 12. **P. Rambabu**, Giuseppe Zollo, V. Kanchana. “Electronic topological transitions and vibrational properties of A-15 type X_3Y (X= V, Cr and Mo; Y= Os, Ir and Pt) compounds: A first-principles study.” **Journal of Physics and Chemistry of Solids** 152 (2021) 109953.

13. Priyanath Mal, Bipul Das, G. Bera, **P. Rambabu**, G. R. Turpu, C. V. Tomy, and Pradip Das. "Observation of 2D transport in Sn-and In-doped $\text{Bi}_{2-x}\text{Sb}_x\text{Te}_{3-y}\text{Se}_y$ topological insulator." **Journal of Applied Physics** 129.9 (2021): 095702.
14. Antu Laha, **P. Rambabu**, V. Kanchana, L. Petit, Z. Szotek, and Z. Hossain. "Experimental and theoretical study of the correlated compound YbCdSn : Evidence for large magnetoresistance and mass enhancement." **Physical Review B** 102.23 (2020): 235135.
15. Aradhya Mishra, Archana Panigrahi, Priyanath Mal, Santosh Penta, G. Padmaja, Ganesh Bera, Pradip Das, **P. Rambabu**, Goverdhan Reddy Turpu. "Rapid photodegradation of methylene blue dye by $\text{rGO-V}_2\text{O}_5$ nano composite." **Journal of Alloys and Compounds** 842 (2020) 155746.
16. Priyanath Mal, Bipul Das, G Bera, **P Rambabu**, G R Turpu, C V Tomy and Pradip Das. "Spin splitted topological surface states in PbBi_4Te_7 ." **Journal of Physics D: Applied Physics** 53.48 (2020): 484003.
17. **P. Rambabu**, B. Anuroopa, M. Manivel Raja, V. Kanchana. "Enhanced Curie temperature and spin polarization in Co-based compounds under pressure: A first principles investigation." **Solid State Sciences** 105 (2020) 106257.
18. Ganesh Bera, Aradhya Mishra, Priyanath Mal, Pradip Das, G. Padmaja, **P.Rambabu** and G. R. Turpu. "Methylene Blue Dye Degradation by Bulk, Nano FeVO_4 and rGO-FeVO_4 ." **AIP Conference Proceedings** 2220 (2020) 080070.
19. Ganesh Bera, V. R. Reddy, P. Rambabu, P. Mal, P. Das, G. Padmaja and G. R. Turpu. "Low temperature synthesis of FeVO_4 through mechano milling assisted solid state reaction method." **AIP Conference Proceedings** 2115, (2019) 030110.
20. Antu Laha, Sudip Malick, Ratnadwip Singha, Prabhat Mandal, **P Rambabu**, V Kanchana, Z Hossain. "Magnetotransport properties of the correlated topological nodal-line semimetal YbCdGe ." **Physical Review B** 99.24 (2019): 241102.
21. Swati Deswal, Sachin Kumar Singh, **P Rambabu**, Priyangi Kulkarni, G Vaitheeswaran, B Praveenkumar, Satishchandra Ogale, Ramamoorthy Boomishankar. "Flexible Composite Energy Harvesters from Ferroelectric A_2MX_4 -Type Hybrid Halogenometallates." **Chemistry of Materials** 31.12 (2019): 4545-4552.
22. **P. Rambabu**, V. Kanchana. "Electronic Topological Transitions in CuNiMnAl and CuNiMnSn under pressure from first principles study." **Solid State Sciences** 80 (2018) 92-100.
23. Ganesh Bera, V. R. Reddy, **P. Rambabu**, P. Mal, Pradip Das, N. Mohapatra, G. Padmaja, and G. R. Turpu. "Triclinic–monoclinic–orthorhombic (T-M-O) structural transitions in phase diagram of $\text{FeVO}_4\text{-CrVO}_4$ solid solutions." **Journal of Applied Physics** 122 (2017) 115101.

24. Priyanath Mal, G Bera, **P Rambabu**, G R Turpu, Brahmananda Chakraborty, Lavanya M Ramaniah, R P Singh, Pintu Sen and Pradip Das. "Electronic, magnetic and spectroscopic properties of doped $Mn_{(1-x)}A_xWO_4$ ($A = Co, Cu, Ni$ and Fe) multiferroic: an experimental and DFT study." **J. Phys.: Condens. Matter** 29 (2017) 075901.
25. Priyanath Mal, **P. Rambabu**, G. R.Turpu, A. K. Gupta, Brahmananda Chakraborty, Pintu Sen and Pradip Das. "Energy band gap and spectroscopic studies in $Mn_{1-x}Cu_xWO_4$ ($0 \leq x \leq 0.125$)."
AIP Conference Proceedings 1728 (2016) 020323.
26. **P. Rambabu**, Sunil. K. Srivastava, Pradip Das and Goverdhan Reddy Turpu. "rGO- SnO_2 Composites for Supercapacitor Applications." **IOP Conf. Series: Materials Science and Engineering** 149 (2016) 012169.
27. Ganesh Bera, Sourav Sinha, **P. Rambabu**, P. Das, A. K. Gupta, and G. R. Turpu. "Structural characterization of $FeVO_4$ synthesized by co-precipitation method." **AIP Conference Proceedings** 1728 (2016) 020284.
28. **P. Rambabu**, S. K. Srivastava, and G. R. Turpu. "Study of photo catalytic degradation of an industrial dye Ujala Supreme and Methyl Orange using SnO_2 -rGO composites." **AIP Conference Proceedings** 1728 (2016) 020375.
29. M Hayne, R J Young, E P Smakman, T Nowozin, P Hodgson, J K Garleff, **P Rambabu**, P M Koenraad, A Marent, L Bonato, A Schliwa and D Bimberg. "The structural, electronic and optical properties of GaSb/GaAs nanostructures for charge-based memory." **J. Phys. D: Appl. Phys.** 46 (2013) 264001.
30. E. P. Smakman, J. K. Garleff, R. J. Young, M. Hayne, **P. Rambabu**, and P. M. Koenraad. "GaSb/GaAs quantum dot formation and demolition studied with cross-sectional scanning tunneling microscopy." **Appl. Phys. Lett.** 100 (2012) 142116.

Conferences/Invited lectures:

1. Title of the Paper presented: Electronic Structure Studies of Unstrained and Strained Li_2MnO_3 . International conference on ACCMS-2016 organized by SRM University, Chennai on 22/09/2016.
2. Title of the Paper presented: Metallization of Antiferromagnetic semiconductor NaMnBi under Pressure. International conference on ICMA-GMA-2018 organized by NISER, Bhubaneswar, India on 09/12/2018.
3. Title of the Paper presented: Intrinsic Anomalous (Hall, Nernst) effects in Half-metallic Co_2ZrAl from First Principles Calculations. International conference on FIMTA-2022 organized by CSIR-IMMT Campus, Bhubaneswar, India on 03/08/2022.
4. Invited Lecture: Hands on Training: Density Functional Theory (DFT). 7 Days Workshop on "Material Characterization Techniques" Under the Scheme Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (STUTI-2022) organized by Pure and Applied Physics, Guru Ghasidas Vishwavidyalaya, Bilaspur, India on 01/11/2022.

5. Invited Lecture: Hands-On-Training on “DFT Modelling of Materials for Different Applications” Organized by Department of Physics, Mahatma Gandhi Central University, Motihari, Bihar on 15/03/2024.

6. Invited Lecture: “Berry curvature induced Anomalous Hall and Nernst effects in nearly half-metal CoFeVGe: A first principles study” in the conference on “Emerging trends in Quantum Condensed Matter Physics (EQCMP-2024)” from 21-23 August, 2024 held at Institute of Physics (IOP) Bhubaneswar, India.

7. Oral presentation titled “Berry Curvature Induced Anomalous Hall and Nernst effects in Half-metal FeRuCrSi: A First Principles Study” in the conference on “Asia-Pacific Conference on Condensed Matter Physics 2024 (AC2MP 2024)” from 8-11, December, 2024 held at IIT Patna, Bihar.

8. Invited lecture: “Energy harvesting through thermoelectric and anomalous Nernst effects: A first principles approach” in the conference “One Day National Conference on Recent Advances in Functional Oxides” on 12th December, 2024 held at Mahatma Gandhi Central University, Motihari (Bihar).

9. Invited lecture: “Ab-initio study of Anomalous Hall and Nernst effects in ferromagnetic CoFeVGe Heusler alloy” in the conference on “International Conference on Multifunctional Materials for Societal Applications (ICMMSA-2025) from 26-28th March, 2025 held at Osmania University, Hyderabad, Telangana, India.

National/International Collaborations:

1. Dr. Bheema Lingam Chittari, Department of Physical Sciences, IISER Kolkata, India.
2. Dr. Goverdhan Reddy Turpu, Department of Pure and Applied Physics, GGV, Bilaspur, India.
3. Dr. Pradip Das, Department of Pure and Applied Physics, GGV, Bilaspur, India.

Administrative Experience:

1. Incharge, Departmental website, Pure and Applied Physics, GGV: 2019-till date
2. Member, Board of Studies (BOS), Pure and Applied Physics, GGV: 2021-24
3. Member, Departmental Research Committee (DRC), Pure and Applied Physics, GGV: 2023-24
4. Assistant Center Superintendent, Exams, GGV: 2015, 2016 and 2023
5. Member, Physical Verification Committee, GGV: 2023, 2024 and 2025.


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