

BIO-DATA

Name : Dr. Babita Rani
Designation : Assistant Professor
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Area of Specialization : Theoretical Computational Physics (Nanomaterials)

Academic Qualifications:

1. Ph.D. (2016) in Physics from Department of Physics, Panjab University, Chandigarh.
2. UGC-CSIR, NET (2007) qualified in Physical Sciences.
3. M.Sc. Physics (2007) from Department of Physics, Punjabi University, Patiala.
4. B.Sc. (C.A.) (2004) from Panjab University, Chandigarh.

Teaching Experience:

2012-till date: Assistant Professor, Physics Department, Punjabi University, Patiala.
2009-2012: Assistant Professor, Physics Department, Punjabi University, Patiala.
2007-2009: Lecturer (Adhoc), Physics Department, Punjabi University, Patiala.

Membership of Professional Bodies/Organisations:

1. Life Member, Indian Society of Radiation Physics
2. Life Member, Punjab Academy of Sciences

Medals/Awards/ Honours received:

1. First position holder throughout the academic career.
2. M.Sc. with University Gold Medal.

List of Publications in National/ International Journals:

1. Interaction of Nitrogen Molecule with Graphene, Babita Rani, V. K. Jindal and Keya Dharamvir, AIP Conf. Proc. 1512, 300, 2013; doi: 10.1063/1.4791030.
2. Interaction of Two Nitrogen Molecules with Graphene, Babita Rani, V. K. Jindal and Keya Dharamvir, AIP Conf. Proc., 1536, 363, 2013; doi: 10.1063/1.4810251.
3. Adsorption Configurations of Two Nitrogen Atoms on Graphene, Babita Rani, V. K. Jindal and Keya Dharamvir, AIP Conf. Proc., 1591, 450, 2014; doi: 10.1063/1.4872635.
4. A First Principle Study of Adsorption of Two Proximate Nitrogen Atoms on Graphene, Babita Rani and Keya Dharamvir, Int. J. Quantum Chem., 1619, 114, 2014; doi: 10.1002/qua.24741.

5. Adsorption of Two Sodium Atoms on Graphene -- A First Principles Study, Gagandeep Kaur, Babita Rani, Shuchi Gupta and Keya Dharamvir, AIP Conf. Proc., 1675, 020003, 2015; doi: 10.1063/1.4929161.
6. Energetics of a Li Atom Adsorbed on B/N Doped Graphene with Monovacancy, Babita Rani, V. K. Jindal and Keya Dharamvir, J. Solid State Chem., 240, 67, 2016; doi: 10.1016/j.jssc.2016.05.014.
7. A DFT study of pure and lithium doped gold clusters, Babita Rani, AIP Conf. Proc., 1953, 030164, 2018; doi: 10.1063/1.5032499.
8. Geometries, electronic and magnetic properties of Au_n and $Au_{n-1}Li$ ($n=2-6$) clusters using density functional theory, Amanjot Kaur, Babita Rani, AIP Conf. Proc., 2142, 110010, 2019; doi: 10.1063/1.5122470.
9. Atomistic insights into lithium adsorption and migration on phosphorus-doped graphene, Babita Rani, Vladimir Bubanja, Vijay K. Jindal, Int. J. Quantum Chem., 121, 14, 2021; doi: 10.1002/qua.26659.
10. Density functional theory study of the enhancement of quantum capacitance of graphene by phosphorous doping, Babita Rani, Vladimir Bubanja, Vijay K. Jindal, Int. J. Quantum Chem., 123, 6, 2023; doi: 10.1002/qua.27052.
11. Adsorption of Li/Na atom on pristine and boron doped armchair graphene nanoribbons: A DFT study, Nancy, Babita Rani, Materials Today: Proceedings, doi: 10.1016/j.matpr.2023.03.783. (in press)
12. Enhanced quantum capacitance of MX_4 ($M = Fe, Co, Ni, Cu, \text{ and } Zn; X = N, P$) moieties embedded graphene: a DFT study, Babita Rani, Vladimir Bubanja, Vijay K. Jindal, J. Phys.: Condens. Matter, 35, 415503, 2023; doi: 10.1088/1361-648X/ace578.
13. Quantum capacitance of N/P coordinated Si-doped graphene: A DFT study, Babita Rani, Vladimir Bubanja, Vijay K. Jindal, Physica B: Condensed Matter, 684, 415985, 2024; doi: 10.1016/j.physb.2024.415985.
14. Adsorption and diffusion behavior of lithium atom on boron-doped armchair graphene nanoribbon- A dispersion-corrected DFT study, Nancy, Babita Rani, Physica B: Condensed Matter 695, 416479, 2024; doi: 10.1016/j.physb.2024.416479.

List of Book Chapters:

1. A chapter "Graphene Nanoribbons and Graphene", Nancy, Babita Rani, in a book titled as Current and Future Developments in Nanomaterials and Carbon Nanotubes: Synthesis and Applications of Semiconductor Nanostructures, Vol. 4, p. 278-300, 2023. ISBN (Online): 978-981-5080-11-7.

Presentations in National/ International Conferences/ Symposia:

1. 23rd AGM-MRSI Functional Materials for sustainable Energy and Advanced Technologies at Thapar University, Patiala during Feb 13-15, 2012.
2. International Conference on Emerging Trends in Physics for Environmental Monitoring & Management (ETPEMM-12) at Punjabi University, Patiala during Dec 17-19, 2012.
3. International Conference on Recent Trends in Applied Physics & Material Science (RAM-2013) at Government College of Engineering & Technology, Bikaner during Feb 01-02, 2013.

4. National Symposium on Emerging Trends in Physics for Ionizing Radiations, Aerosols and Material Science (ETPRAM-13) at Punjabi University, Patiala during Dec 13-14, 2013.
5. 58th DAE Solid State Physics Symposium at Thapar University, Patiala during Dec 17-21, 2013.
6. 4th National Conference on Advanced Materials and Radiation Physics (AMRP-15) at SLIET, Longowal during Mar 13-14, 2015.
7. 2nd International Conference on Condensed Matter and Applied Physics (ICC-2017) at Govt. Engg. College, Bikaner during Nov 24-25, 2017.
8. National Seminar on Emerging Research Trends in Experimental Physics (ERTEP-2019) at Guru Nanak College for girls, Sri Muktsar Sahib on Feb 22, 2019
9. International Symposium on Semiconductor Materials and Devices (ISSMD-2020) at Dr. B. R. Ambedkar N.I.T., Jalandhar during Oct 31-Nov 2, 2020.
10. International Conference on Energy and Advanced Materials (ICEAM-2021) at Jaypee Institute of Information Technology, Noida during Oct 21-23, 2021.
11. 6th National Conference on Current Advances in Physical Sciences (CAPS-2023) at Khalsa College, Amritsar on Feb 8, 2023.
12. 8th National Conference on Science & Technology for Nation Development : Opportunities & Global Challenges (NCSTND-2023) at Arya P.G. College, Panipat on Feb 28, 2023.
13. One Day National Seminar on Condensed Matter Physics and Materials (CMPM-2023) at Punjabi University, Patiala on May 8, 2023.
14. 4th International Conference on Condensed Matter and Applied Physics (ICC-2023) at Govt. Engg. College, Bikaner during Oct 9-10, 2023.
15. International Conference on Material Science, technology and sustainable environment (ICMSTSE-2024) at RPSGOI, Balana, Mahendergarh during April 18-19, 2024.
16. International Conference on Materials and Applied Science for Society (MASS-2024) at Anand Niketan College of Science, Arts and Commerce, Anandwan during Dec 30-31, 2024.
17. National Conference Cum Workshop on Computational and Experimental Techniques for Advanced Functional Materials (NCCET-AFM 2025) at Panjab University, Chandigarh during Feb 27-28, 2025.
18. 4th International Conference on Innovations in Science and Technology for Viksit Bharat (ICISTVB-2025) at Arya P.G. College, Panipat during March 21-22, 2025.

Workshops/Programmes/Courses Attended:

1. Visited IUAC, New Delhi from 02-09-2012 to 09-09-2012 for high performance computing.
2. Seminar cum Workshop on First Principle and other Simulation Methods in Condensed Matter Physics at Department of Physics, Himachal Pradesh University, Shimla from 22-03-2010 to 29-03-2010.

3. UGC sponsored 24th Orientation Programme at UGC-HRDC, Punjabi University, Patiala from 08-04-2015 to 05-05-2015.
4. UGC sponsored Refresher Course in Physical Sciences at UGC-HRDC, Punjabi University, Patiala from 20-06-2016 to 09-07-2016.
5. UGC sponsored Short term course on Research Methodology at UGC-HRDC, Punjabi University, Patiala from 24-09-2018 to 29-09-2018.
6. UGC sponsored 61st online short term course on e-content development at UGC-HRDC, Gujarat University, Patiala 25-06-2020 to 01-07-2020.
7. Completed MOOC course "Mechanics: Motion, Forces, Energy and Gravity, from particles to Planets" authorized by UNSW, Sydney through Coursera on 22.08.2021.
8. UGC sponsored Refresher course in Information Communication Technology (ICT) at UGC-HRDC, Punjabi University, Patiala from 13.09.2021 to 25.09.2021.
9. UGC-Approved Short-Term Professional Development Programme on Implementation of NEP-2020 for University and College Teachers from 18.11.2022 to 26.11.2022.
10. NEP 2020 Orientation & Sensitization Programme under Malaviya Mission Teacher Training Programme of University Grants Commission organized by Punjabi University, Patiala from 18.07.2024 to 29.07.2024.

No. of Ph.D./M.Sc. Students guided/under guidance:

Completed: 03, Ongoing: 02

List of Papers/ Courses taught at P.G. and U.G. Level:

1. Classical Mechanics- PG
2. Quantum Mechanics- PG
3. Mathematical Methods of Physics- PG
4. Introduction to Nanotechnology- PG

Technical Proficiency:

Working knowledge of DFT based softwares like VASP, different visualization tools/software like Xmakemol, Xcrysden, Origin, and VMD, well versed in Linux based OS (Ubuntu), DOS, and Windows and Fortran programming language.

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Dr. Babita Rani