

**FACULTY MEMBERS' ACADEMIC PROFILE**

- 1. Name of the Faculty member:** Dr. SUBHADIP NATH
- 2. Designation:** Assistant Professor in Physics (W.B.E.S.)
- 3. Qualification:** M.Sc. (University of Kalyani);  
Ph.D. (University of Kalyani)
- 4. Specialization:** Condensed Matter Physics
- 5. E-mail address:** subha.31connect@gmail.com
- 6. Date of Joining in W.B.E.S.:** 26.02.2015
- 7. Date of Joining in this College:** 26.02.2015
- 8. Total Teaching experience in College level:** 5+ years
- 9. Research interests:** High Temperature Superconductivity, Electron-Phonon Interactions, Density Functional Theory, Graphene and its Allotropes
- 10. Title of thesis (Ph.D.) with year:** "A Study on some aspects of High temperature Superconductivity using Hubbard Model and it's variants" (Awarded in March, 2017)
- 11. Research guidance:** Nil
- 12. Research Projects (Completed and ongoing):** Nil
- 13. List of publications:**

**A) Published papers in Journals:**

1. "Finite Temperature Properties of the 2D Hubbard Model extended by Next-Nearest-Neighbor Hopping Interaction", **S. Nath** and N. K. Ghosh, *Indian Journal of Physics*, **2012**, 86(5), 351-356 [ISSN 0973-1458; IF: 1.242].
2. "On-site and Inter-site Electron-Phonon Interaction in 2D Hubbard Model", **S. Nath**, N. S. Mondal and N. K. Ghosh, *Physica B*, **2013**, 412, 83-86 [ISSN 0921-4526; IF: 1.874].
3. "Thermodynamics of the Frustrated 2D Hubbard Model", **S. Nath\*** and N.K. Ghosh, *Journal of Superconductivity and Novel Magnetism*, **2014**, 27, 1347-1352 [ISSN 1557-1939; IF: 1.13].
4. "Ground-State Properties of the Frustrated 2D Quarter-Filled Hubbard Model", **S. Nath\*** and N. K. Ghosh, *Journal of Superconductivity and Novel Magnetism*, **2014**, 27, 2871-2877 [ISSN 1557-1939; IF: 1.13].
5. "Interplay between Electron-Phonon Interaction and Hubbard Repulsion: An Exact Approach", **S. Nath\***, N. S. Mondal and N. K. Ghosh, *Journal of Superconductivity and Novel Magnetism*, June, **2015**, 28, 1687-1692 [ISSN 1557-1939; IF: 1.13].
6. "Phonon-Mediated Electron-Phonon Interaction in Hubbard-Holstein Model", **S. Nath\*** and N. K. Ghosh, *Journal of Low Temperature Physics*, January, **2016**, 182, 1-12 [ISSN 0022-2291; IF: 1.491].

7. "Electron-Phonon Interaction in the presence of Strong Coulomb Repulsion", **S. Nath\***, N. S. Mondal and N. K. Ghosh, *Journal of Superconductivity and Novel Magnetism*, January, **2018**, 31, 29-35 [ISSN 1557-1939; IF: 1.13].
8. "Relevance of inter-site Coulomb repulsion on high-T<sub>c</sub> superconductivity within t-J-V model", P. Pal, K. Roy, **S. Nath\*** and N. K. Ghosh, *Chinese Journal of Physics*, March, **2018**, 56, 958-964 [ISSN 0577-9073; IF: 2.544].
9. "Hole pairing and ground state properties of high-T<sub>c</sub> superconductivity within the t-t'-J-V model", K. Roy, P. Pal, **S. Nath\***, N. K. Ghosh, *The European Physical Journal B*, April, **2018**, 91, 64-1-64-9 [ISSN 1434-6028; IF: 1.44].
10. "Hole-polarons and bipolarons in the Holstein t-J model: Relevance of hole-phonon interaction" K. Roy, **S. Nath\*** and N.K. Ghosh, *Physics Letters A*, April, **2019**, 383, 1510-1515 [ISSN 0375-9601; IF: 2.087].
11. "Specific Heat, Entropy and Magnetic Properties of High T<sub>c</sub> Superconductivity within the planar t-t'-J-V model" K. Roy, S. Ghosh, **S. Nath\*** and N.K. Ghosh, *The European Physical Journal B*, December, **2019**, 92,270 [ISSN 1434-6028; IF: 1.44].
12. "Mobile inter-site bipolarons in presence of long-range interactions" N.S. Mondal and **S. Nath\***, *Physica B*, February, **2020**, 578, 411881 [ISSN 0921-4526; IF: 1.874].
13. "The topology and robustness of two Dirac cones in S-graphene: A tight binding approach" A. Bandopadhyay, S. Dutta, D. Jana, **S. Nath** and M. Mohi Uddin, *Scientific Reports*, February, **2020**, 10, 2502 [ISSN 2045-2322; IF: 4.122].
14. **Subhadip Nath**, Arka Bandyopadhyay Sujoy Datta, Md. Mohi Uddin, Debnarayan Jana, "Electronic and optical properties of non-hexagonal Dirac material S-graphene sheet and nanoribbons" *Physica E*, June, **2020**, 120, 114087 [ISSN 1386-9477; IF: 3.382].
15. Niladri Sekhar Mondal , **Subhadip Nath**, Debnarayan Jana and Nanda Kumar Ghosh, "Band engineering of non-hexagonal 2D tetragonal-silicene sheet and nanoribbons: A theoretical approach" *Journal of Physics and Chemistry of Solids*, March, **2021**, 150, 109801[ISSN 0022-3697; IF: 3.995].
16. **Subhadip Nath**, Arka Bandyopadhyay, Sabyasachi Sen, Debnarayan Jana "First principles investigation of structural, electronic and optical properties of synthesized radiannulene oligomers for 6,6,12-graphyne" *Journal of Physics and Chemistry of Solids*, June, **2021**, 153, 109990 [ISSN 0022-3697; IF: 3.995]
17. Niladri Sekhar Mondal , **Subhadip Nath**, Debnarayan Jana and Nanda Kumar Ghosh, 'First-principles study of the optical and thermoelectric properties of tetragonal-silicene' *Physical Chemistry Chemical Physics*, May, **2021**, 23 (20), 11863 – 11875 [ISSN 1463-9076 ; IF: 3.676].

18. **Subhadip Nath** ‘Thermoelectric and optical properties of 2D hexagonal Dirac material Be<sub>3</sub>X<sub>2</sub> (X = C, Si, Ge, Sn): A density functional theory study’ Journal of Applied Physics, August, **2021**, 130, 055106 [ISSN 0021-8979; IF: 2.546].
19. Supriya Ghosal, **Subhadip Nath**, Arka Bandyopadhyay, Sabyasachi Sen, and Debnarayan Jana ‘Tetragonal Silicene and Germanene Quantum Dots: Candidates for Enhanced Nonlinear Optical and Photocatalytic Activity’ Journal of Physical Chemistry C October, **2021**, 125, 21718–21728 [ISSN 1932-7447; IF: 4.126].
20. Niladri Sekhar Mondal, **Subhadip Nath**, Suman Chowdhury and Debnarayan Jana ‘Electric field-induced electronic-thermoelectric-optical properties of typical isoelectronic HNC6 monolayers: a theoretical study’ Applied Surface Science, April, **2022**, 581, 152094 [ISSN 0169-4332; IF: 6.707].
21. Medha Rakshit, **Subhadip Nath**, Suman Chowdhury, Rajkumar Mondal, Dipali Banerjee, Debnarayan Jana ‘A study of anisotropic thermoelectric properties of bulk Germanium Sulfide in its Pnma phase: a combined first-principles and machine-learning approach’ Physica Scripta, 97 (12) (2022) 125804 [ISSN 1402-4896; IF: 3.081].

### **B) Conference Proceedings:**

1. “Electron phonon interaction in high-T<sub>c</sub> superconductors”, **S. Nath**, N.S. Mondal, S.K. Bhowmick, and N.K. Ghosh, *Proceedings of the ‘International Conference on Recent Trends in Applied Physics and Material Science’*, AIP Conf. Proc., **2013**, 1536, 325-326.
2. “Bipolaron by inter-site electron-phonon interaction”, N.S. Mondal, **S. Nath**, S. Bose, and M. Paul, *Proceedings of the ‘57th DAE Solid State Physics Symposium 2012’*, AIP Conf. Proc., **2013**, 1512, 810-811.
3. “Electron phonon interaction in Hubbard model”, **S. Nath**, N.S. Mondal, N.K. Ghosh, and S.K. Bhowmick, *Proceedings of the ‘57th DAE Solid State Physics Symposium 2012’*, AIP Conf. Proc., **2013**, 1512, 1084-1085.
4. “Ground state properties of the frustrated Hubbard model”, **S. Nath**, N.K. Ghosh, S.K. Bhowmick, and N.S. Mondal, *Proceedings of the ‘International Conference on Recent Trends in Applied Physics and Material Science’*, AIP Conf. Proc., **2013**, 1536, 1093-1094.
5. “Interplay between Electron-Phonon Interaction and Hubbard Repulsion: Bipolaron Formation”, **S. Nath**, N.S. Mondal, and N.K. Ghosh, *Proceedings of the ‘59th DAE Solid State Physics Symposium 2014’*, AIP Conf. Proc., **2015**, 1665, 090022-1-090022-3.
6. “Superlight Bipolarons in High T<sub>c</sub> Superconductors”, **S. Nath**, N.S. Mondal, K. Roy and N.K. Ghosh, *Proceedings of the ‘59th DAE Solid State Physics Symposium 2014’*, AIP Conf. Proc., **2015**, 1665, 130031-1-130031-3.

7. "Small Superlight Bipolarons within  $t$ - $J_p$  model", K. Roy, **S. Nath** and N.K. Ghosh, *Proceedings of the 'International Conference on Condensed Matter and Applied Physics (ICC 2015)'*, AIP Conf. Proc., **2016**, 1728, 020019-1-020019-4.
8. "Interplay between on-site electron-phonon interaction and inter-site Coulomb repulsion", **S. Nath**, N.S. Mondal, K. Roy and N.K. Ghosh, *Proceedings of the '60th DAE Solid State Physics Symposium 2015'*, AIP Conf. Proc., **2016**, 1731, 090032-1-090032-3.
9. "High- $T_c$  Superconductivity: The  $t$ - $J$ - $V$  Model and its Applications", K. Roy, P. Pal, **S. Nath** and N.K. Ghosh, *Proceedings of the '60th DAE Solid State Physics Symposium 2015'*, AIP Conf. Proc., **2016**, 1832, 130024-1-130024-3.
10. "Hole Pairing and Thermodynamic Properties of the Two Dimensional Frustrated  $t$ - $J$  model", K. Roy, P. Pal, **S. Nath** and N.K. Ghosh, *Proceedings of the '62<sup>nd</sup> DAE Solid State Physics Symposium 2017'*, AIP Conf. Proc., **2018**, 1942, 130012-1-130012-3.
11. "On some ground state characteristics of the  $t$ - $J$ - $V$  model", P. Pal, K. Roy, **S. Nath** and N.K. Ghosh, *Proceedings of '2nd International Conference on Condensed Matter and Applied Physics (ICC 2017)'*, AIP Conference Proceedings, **2018**, 1953, 120003-1-120003-4.

**14. Membership of Learned Societies/ Editorial Boards, etc.:** Nil

**15. Patents:** Nil

**16. Awards:** CSIR-NET (thrice), Gate 2009

**17. Other notable activities:** Nil

**18. A) Participation in Seminars/Symposia/Conferences/Workshops:**

1. **Presented a paper** entitled "*Numerical studies on High Temperature Superconductors using Hubbard Model*" in the **National Conference 'Condensed Matter Days 2010'**, organized by Department of Physics, University of Kalyani from **25<sup>th</sup>-27<sup>th</sup> August, 2010**.
2. **Presented a paper** entitled "*Thermodynamic properties of the 2D extended Hubbard model*" in the **National Conference 'Condensed Matter Days 2011'**, organized by Department of Physics, Gauhati University from **24<sup>th</sup>-26<sup>th</sup> August, 2011**.
3. **Participated** in the **International level '56<sup>th</sup> DAE- Solid State Physics Symposium'**, organized by SRM University, Kattankulathur, Tamil Nadu on 19<sup>th</sup>-23<sup>rd</sup> December, 2011.
4. **Presented a paper** entitled "*Pairing Susceptibility and Hole dynamics in the extended 2D Hubbard model*" in the UGC sponsored Second **National Seminar** on '*Recent Trends in Condensed Matter Physics including Laser Applications (NSCMPLA-2012)*', organized by Department of Physics, University of Burdwan on **22-23<sup>rd</sup> March, 2012**.
5. **Presented a paper** entitled "*Electron phonon interaction in Hubbard model*" in the **International level '57<sup>th</sup> DAE- Solid State Physics Symposium'**, organized by Indian Institute of Technology, Bombay, Mumbai on 3<sup>rd</sup>-7<sup>th</sup> December, 2012.

6. **Presented a paper** entitled "*Ground state properties of the frustrated Hubbard model*" in the '*International Conference on Recent Trends In Applied Physics and Material Science RAM-2013* ', organized by Govt. College of Engineering and Technology, Bikaner on 1<sup>st</sup>-2<sup>nd</sup> February, 2013
7. **Presented a paper** entitled "*Interplay between Electron-Phonon Interaction and Hubbard Repulsion: Bipolaron Formation*" in the **International level** '*59<sup>th</sup> DAE- Solid State Physics Symposium*', organized by VIT University, Vellore on 16<sup>th</sup> -20<sup>th</sup> December, 2014.
8. **Presented a paper** entitled "*High- $T_c$  Superconductivity: The  $t$ - $J$ - $V$  Model and its Applications*" in the **International level** '*60<sup>th</sup> DAE- Solid State Physics Symposium*', organized AMITY University UP, Noida on 21<sup>st</sup>-25<sup>th</sup> December, 2015.
9. **Presented a paper (Oral presentation)** entitled "*Electron-Phonon Interaction in Presence of Inter-site Coulomb Repulsion*" in the **National Conference** on '*Emerging Trends in Condensed Matter Physics and Material Science*', organized by Department of Physics, University of Kalyani on **18-19<sup>th</sup> March, 2016**.
10. **Presented a paper** entitled "*Interplay Between Inter-site Electron-Phonon Interaction and Inter-site Coulomb Repulsion*" in the **National Seminar** on '*Recent Trends in Condensed Matter Physics including Laser Applications (NSCMPLA-2017)*', organized by Department of Physics, University of Burdwan on **8-9<sup>th</sup> March, 2017**.
11. **Presented a paper** entitled "*Electronic Structure of S-Graphene sheet and Nanoribbon*" in the **National Seminar** '*Condensed Matter Days 2018 (CMDAYS-2018)*' organized by Department of Physics, University of Burdwan on **29<sup>th</sup> to 31<sup>st</sup> August, 2018**
12. **Presented a paper** entitled "*Electronic and Optical Properties of S-Graphene Sheet and Nanoribbon*" in the **National Seminar** '*National Conference on Recent Developments in nanoscience and Nanotechnology (NCRDNN)*' organized by School of materials Science and Nanotechnology, Jadavpur University on **29<sup>th</sup> to 31<sup>st</sup> January, 2019**
13. **Presented a paper (Oral presentation)** entitled "*Ab initio study of the electronic, optical and thermal properties of non-hexagonal Dirac material S-Graphene sheet*" in the **National Seminar** '*Condensed Matter Days 2019 (CMDAYS-2019)*' organized by Department of Physics, Vidyasagar University, Midnapore on **29<sup>th</sup> to 31<sup>st</sup> August, 2019**

#### **B) Participation in OP/RC:**

- Participated in the UGC sponsored **Orientation Programme (OP-119)** organized by the UGC-HRDC, University of Calcutta from **17<sup>th</sup> July to 12<sup>th</sup> August, 2017**.
- Participated in the UGC sponsored **3<sup>rd</sup> Refresher course on Nano-science and Nano-technology** organized by the UGC-HRDC, University of Burdwan from **14<sup>th</sup> September to 4<sup>th</sup> October, 2018**

- Participated in the UGC sponsored **Refresher course on Physics** organized by the UGC-HRDC, University of Calcutta from **15<sup>th</sup> February-28<sup>th</sup> February, 2022**