

Annexure-I

List of Publications:

(a) Publications in Refereed Journals :

1. "Nuclear structure and α -decay study of Og isotopes "
R. R. Swain, **B.B. Sahu**, P. K. Moharana, and S. K. Patra
Int. J. Mod. E **28**, 1950041 (2019).
I.F.: 1.386
2. "Structure and reaction dynamics of SHE $Z = 130$ "
R. R. Swain and **B.B. Sahu**
Chin. Phys. C **43**, 104103 (2019).
I.F.: 5.861
3. "Nuclear structure and decay modes of Ra isotopes within an axially deformed relativistic mean field model "
R. R. Swain, S.K. Patra and **B.B. Sahu**
Chin. Phys. C **42**, 084102 (2018).
I.F.: 5.861
4. "Importance of non-linearity in NN potential "
B. B. Sahu, S. K. Singh, M. Bhuyan, S. K. Biswal, and S. K. Patra
Phys. Rev. **C89**, 034614 (2014).
I.F.: 3.132
5. "Examining the stability of Sm nuclei around $N=100$ "
S. K. Ghorui, **B. B. Sahu**, C. R. Praharaj, and S. K. Patra
Phys. Rev. **C85**, 064327 (2012).
I.F.: 3.132
6. "Analysis of Nucleus-Nucleus Fusion Cross-Section at Extreme Sub-Barrier Energies"
Basudeb Sahu and **Bidhubhusan Sahu**

International Journal of Modern Physics E, **21**, 1250067 (2012)

I.F.: 1.386

7. “SPECTROSCOPIC STUDY OF $^{161,163}\text{Er}$ IN DEFORMED HARTREE-FOCK THEORY”
B. B. Sahu, S. K. Singh, S. K. Patra, C. R. Praharaj, M. Bhuyan, Z. Naik, and S. K. Ghorui
ACTA PHYSICA POLONICA B, **43**, 451 (2012).

I.F.: 0.998

8. “ Half-lives of proton emitters using relativistic mean field theory”

Bidhubhusan Sahu, S. K. Agarwalla, and S. K. Patra

Phys. Rev. **C84**, 054604 (2011).

I.F.: 3.132

9. “ α -decay and fusion phenomena in heavy ion collisions using nucleon-nucleon interactions derived from relativistic mean-field theory”

BirBikram Singh, **B. B. Sahu** and S. K. Patra,

Phys. Rev. **C83**, 064601 (2011).

I.F.: 3.132

10. “ Accurate delta potential approximation for a coordinate dependent potential and its analytical solution”

Basudeb Sahu and **B. B. Sahu**,

Phys. Lett. A **373**, 4033 (2009).

I.F.: 2.087

11. “Description of scattering and fusion phenomena on $^{16}\text{O} + ^{58}\text{Ni}$ system”

Basudeb Sahu and **B. B. Sahu**,

Orissa Journal of Physics Vol. **16**, 41 (2009).

I.F.: 0

12. “ Unified description of scattering and fusion phenomena in heavy-ion collisions”

Basudeb Sahu, G. S. Mallick, **B. B. Sahu**, S. K. Agarwalla and C. S. Shastri,

Phys. Rev. **C77**, 024604 (2008).

I.F.: 3.132

13. “Evaluation of eigenvalues of a smooth potential via Schrödinger transmission across multi-step potential”

Basudeb Sahu, **B. B. Sahu** and S. K. Agarwalla,
Pramana-journal of physics Vol. **70**, No.1, 27 (2008).

I.F.: 1.185

14. “**To be submitted**”

Structure of Rotational Bands and K Isomers in $^{168,170,172,174}\text{Hf}$ Nuclei

B. B. Sahu, Z. Naik, S. K. Ghorui, and C. R. Praharaaj

Abstract: The structures of $^{168,170,172,174}\text{Hf}$ nuclei are studied in the framework of deformed Hartree-Fock and angular momentum projection formalism using surface delta interaction for protons and neutrons in the $\text{sdg}_{7/2}\text{h}_{11/2}$ space (protons) and $\text{fph}_{9/2}\text{i}_{13/2}$ space (neutrons). The ground band, RAL band due to rotation-alignment of $\text{i}_{13/2}$ neutrons and the interaction of these two bands along with the excited large K bands are investigated. The $B(E2)$ values are also given and compared with the available experimental data. Spectra and electromagnetic properties of ground and K isomeric bands are also given.

(b) Conference proceedings :

1. "Alpha decay of $Z = 130$ element"
R. R. Swain and **B. B. Sahu**
DAE-BRNS Symposium on Nuclear Physics Vol. **64**, 154 (2019).
2. "Ground State Properties of Es Isotopes"
C. Dash, P. K. Moharana, I. Naik and **B. B. Sahu**
DAE-BRNS Symposium on Nuclear Physics Vol. **64**, 312 (2019).
3. "Possible shell or sub-shell closure around $A = 220$ "
R. R. Swain, C. Dash, P. K. Moharana, I. Naik, and **B. B. Sahu**
DAE-BRNS **International** Symposium on Nuclear Physics Vol. **63**, 142 (2018).
4. "Structural properties of Super-heavy Nuclei with $Z = 126$ "
R. R. Swain, S. K. Patra and **B. B. Sahu**
DAE-BRNS **International** Symposium on Nuclear Physics Vol. **63**, 224 (2018).
5. "J Selection Rule and Reduced Matrix Elements of K-Isomer Decay: $K=6^+$ Isomer Decay of ^{170}Hf to the Ground Band"
B. B. Sahu, Z. Naik, and C.R. Praharaj
DAE-BRNS **International** Symposium on Nuclear Physics Vol. **63**, 226 (2018).
6. "Formation of medium heavy mass nuclei through r-process"
R. R. Swain, S. K. Patra and **B. B. Sahu**
DAE-BRNS **International** Symposium on Nuclear Physics Vol. **63**, 792 (2018).
7. "Cluster Radioactivity Study of Pt Isotopes"
R. R. Swain, P. K. Moharana and **B. B. Sahu**
DAE-BRNS **International** Symposium on Nuclear Physics Vol. **63**, 172 (2018).
8. "Bands and Isomers in Neutron-Rich Rare-Earth Nuclei in PHF Model"
C. R. Praharaj, S. K. Ghorui, Z. Naik and **B. B. Sahu**
Proc. 14th Int. Symp. on Nuclei in the Cosmos (NIC2016) JPS Conf. Proc.**14** , 021005 (2017)
9. "Ground state properties of $Z = 118$ "
R. R. Swain, S. K. Patra and **B. B. Sahu**
DAE-BRNS Symposium on Nuclear Physics Vol. **62**, 242 (2017).
10. "Band Structures and K Isomers of ^{178}Hf "
B. B. Sahu, Z. Naik, S. K. Ghorui, S. K. Patra and C. R. Praharaj
DAE-BRNS Symposium on Nuclear Physics Vol. **62**, 244 (2017).

11. "Study Of High Spin State Of ^{50}Ti using DHF Model "
M.Kushal, **B. B. Sahu**, Z. Naik, and C. R. Praharaj
DAE-BRNS Symposium on Nuclear Physics Vol. **62**, 312 (2017).
12. " α -decay half lives of $^{294}118$ nucleus "
R.R.Swain, and **B.B.Sahu**
DAE-BRNS Symposium on Nuclear Physics Vol. **62**, 322 (2017).
13. "Isotopic dependence of fusion probabilities for oxygen nuclei and ^{92}Zr "
R.R.Swain, B. Sahu, and **B.B.Sahu**
DAE-BRNS Symposium on Nuclear Physics Vol. **62**, 644 (2017).
14. "Cluster decay of Ra isotope
R.R.Swain, and **B.B.Sahu**
DAE-BRNS Symposium on Nuclear Physics Vol. **61**, 210 (2016).
15. "Deformed Band Structures and K Isomers in ^{170}Er
B. B. Sahu, Z. Naik, S. K. Ghorui, and C. R. Praharaj DAE-BRNS Symposium on Nuclear Physics Vol. **61**, 292 (2016).
16. "Study of K-Isomers in Hafnium Nuclei"
B. B. Sahu, Z. Naik, S. K. Ghorui, and C. R. Praharaj
DAE-BRNS Symposium on Nuclear Physics Vol. **60**, 196 (2015).
17. "Fusion Reaction Study of $^{16}\text{O}+^{92}\text{Zr}$ System"
R. R. Swain, R. K. Paira, **B. B. Sahu**, and B. Sahu
DAE-BRNS Symposium on Nuclear Physics Vol. **60**, 566 (2015).
18. " α -decay Half-lives Study of Superheavy Nuclei"
R. K. Paira, **B. B. Sahu**, and B. Sahu
DAE-BRNS Symposium on Nuclear Physics Vol. **60**, 274, (2015).
19. "Band Structure and Deformed Configurations in ^{166}Er "
B. B. Sahu, S. K. Ghorui, C. R. Praharaj, S.K. Patra, and Z. Naik
DAE-BRNS Symposium on Nuclear Physics Vol. **59**, 254 (2014).
20. "Fusion barrier distribution described by pocket resonances"
R. K. Paira, **B. B. Sahu**, and B. Sahu
DAE-BRNS Symposium on Nuclear Physics Vol. **59**, 378 (2014).
21. "Reaction Dynamics of $^6\text{Li}+^{209}\text{Bi}$ System
B. B. Sahu, R. K. Paira, and B. Sahu
DAE-BRNS Symposium on Nuclear Physics Vol. **59**, 610 (2014).

22. "High Spin Spectroscopy of ^{168}Hf Nucleus"
B. B. Sahu, S. K. Singh, Z. Naik, S.K. Patra, and C.R. Praharaaj
DAE-BRNS **International** Symposium on Nuclear Physics Vol. **58**, 246 (2013).
23. "Yrast Spectra of ^{140}Ba in Deformed Hartree-Fock and J Projection Model"
Shailesh. K. Singh, **B. B. Sahu**, C. R. Praharaaj, S. K. Patra, Z. Naik, and R. K. Bhowmik
DAE-BRNS **International** Symposium on Nuclear Physics Vol. **58**, 248 (2013).
24. "The Relativistic Lagrangian: Nucleon-Nucleon Potential"
B. B. Sahu, S. K. Singh, M. Bhuyan, and S. K. Patra
AIP Conf. Proc. Vol. **1524**, 3 (2013).
25. "The nucleon-nucleon potential from relativistic mean field theory"
B. B. Sahu, M. Bhuyan, S. K. Singh, and S. K. Patra
DAE-BRNS Symposium on Nuclear Physics Vol. **57**, 198 (2012).
26. "Spectroscopic Study of ^{171}Hf Nucleus"
B. B. Sahu, S.K. Ghorui, Z. Naik, S. K. Patra, and C.R. Praharaaj
DAE-BRNS Symposium on Nuclear Physics Vol. **57**, 246 (2012).
27. "Delay-Time in One-Dimensional Potential Scattering"
S. K. Agarwalla, **B. B. Sahu**, G. S. Mallick and B. Sahu
National Seminar on Innovative Fields of Ballistics and Applied Physics
21st January 2012, Page-115
ISBN No. 978-81-8424-746-6
28. "Study of Band Gap for One-Dimensional Periodic Potential with Position Dependent Mass"
S. K. Agarwalla, **B. B. Sahu**, G. S. Mallick and B. Sahu
National Seminar on Innovative Fields of Ballistics and Applied Physics
21st January 2012, Page-120
ISBN No. 978-81-8424-746-6
29. "Microscopic nucleon–nucleon interaction obtained from relativistic-mean-field theory and its application to nucleus decay"
B. B. Sahu and S. K. Patra
National Conference on Recent Advances in Science for Technology
(RAST-2012) February 27-28, 2012
Veer Surendra Sai University of Technology, Burla Sambalpur-768018, Odisha

30. "Microscopic study of proton emission from heavy nuclei"
B. B. Sahu, S. K. Agarwalla , and S. K. Patra
 DAE-BRNS Symposium on Nuclear Physics Vol. **56**, 516 (2011).
31. "Study of the fusion phenomena in heavy ion collisions and the α -decay using nucleon-nucleon interaction derived from relativistic mean field theory"
 BirBikram Singh, **B. B. Sahu**, and S. K. Patra
 DAE-BRNS Symposium on Nuclear Physics Vol. **56**, 546 (2011).
32. "Band Structure Study of ^{161}Er Nucleus."
B. B. Sahu, S.K. Singh, M. Bhuyan, S.K. Ghorui, Z. Naik, S.K. Patra, and C.R. Praharaj
 DAE-BRNS Symposium on Nuclear Physics Vol. **56**, 308 (2011).
33. "New form of nuclear potential for unified description of heavy-ion scattering and fusion cross sections at extreme sub-barrier energies"
 Basudeb Sahu and **B. B. Sahu**,
 DAE-BRNS Symposium on Nuclear Physics Vol. **55**, 394 (2010).
34. "Tunneling through a composite potential and understanding deep sub-barrier fusion reactions"
 Basudeb Sahu and **B. B. Sahu**,
 DAE-BRNS **International** Symposium on Nuclear Physics Vol. **54**, 302 (2009).
35. " Study of scattering and fusion cross sections for $^{16}\text{O} + ^{58,62}\text{Ni}$ around Coulomb barrier"
B. B. Sahu and Basudeb Sahu,
 DAE-BRNS **International** Symposium on Nuclear Physics Vol. **54**, 290 (2009).
36. " Analysis of scattering and fusion in $^{19}\text{F} + ^{208}\text{Pb}$ system"
 Basudeb Sahu, **B. B. Sahu**, P. Prema, and C. S. Shastry
 DAE-BRNS Symposium on Nuclear Physics Vol. **53**, 423 (2008).
37. " Channel coupling through oscillation modulated vibratory driving field in nucleus-nucleus collision"
 Basudeb Sahu, **B. B. Sahu**, and P. Prema
 DAE-BRNS Symposium on Nuclear Physics Vol. **53**, 418 (2008).
38. "Multi-step potential approximation for evaluation of eigenvalues of smooth potential"
 Basudeb Sahu, **B. B. Sahu** and S. K. Agarwalla, *Bulletin of Orissa Physical Society* Vol. **XV**, 47 (2008).
39. " Qunatum mechanical alpha decay rate of superheavy elements"
 Basudeb Sahu, **B. B. Sahu**, S. K. Agarwalla, Y. K. Gambhir and C. S. Shastry
 DAE-BRNS Symposium on Nuclear Physics Vol. **52**, 427 (2007).

40. “ Simultaneous description of scattering and fusion on $^{16}\text{O} + ^{208}\text{Pb}$ ”
Basudeb Sahu, G. S. Mallick, **B. B. Sahu**, S. K. Agarwalla, and C. S. Shastry
DAE-BRNS Symposium on Nuclear Physics Vol. **52**, 319 (2007).
41. “ Profuse sub-barrier tunneling through a repulsive potential supported by attractive wells on either side ”
Basudeb Sahu, S. K. Agarwalla, G. S. Mallick, **B. B. Sahu**, and C. S. Shastry
DAE-BRNS Symposium on Nuclear Physics Vol. **51**, 451 (2006).
42. “ Versatility of Ginocchio type potential barrier in nucleus-nucleus collisions ”
S. K. Agarwalla, Basudeb Sahu, G. S. Mallick, **B. B. Sahu**, and C. S. Shastry
DAE-BRNS Symposium on Nuclear Physics Vol. **51**, 389 (2006).
43. “ Resonances in the barrier region”
P. Prema, S. Mahadevan, S. K. Agarwalla, G. S. Mallick, **B. B. Sahu**, Basudeb Sahu and C. S. Shastry
DAE-BRNS Symposium on Nuclear Physics Vol. **51**, 339 (2006).

Deformed Hartree-Fock and Angular Momentum Projection calculations are performed for some medium-heavy nuclei with mass number $A = 76$ to $A = 130$. In our model we can calculate the energy spectra and other electromagnetic moments for even-even parents and daughter as well as odd-odd intermediate nuclei. This is an interesting feature of our model. In contrast to PSM where a large number of configurations is needed to understand low-lying yrast spectra, it is found that angular momentum projection (AMP) from a few low-lying configurations can reasonably reproduce the yrast-spectra. Sometimes the AM... The spectroscopic data of the molecule in the ground state were calculated using Hartree-Fock and Density Functional Method (B3LYP) with 6-31G(d,p) basis set. With the observed FTIR and FT-Raman data, a complete vibrational band assignment and analysis of the fundamental modes of the compound were carried out. @inproceedings{Harikrishnan2015DensityFT, title={Density functional theory, restricted Hartree-Fock simulations and FTIR, FT-Raman and UV-Vis spectroscopic studies on Metronidazole}, author={S. Harikrishnan and T. J. Bhoopathy}, year={2015} }. S. Harikrishnan, T. J. Bhoopathy. Published 2015. The FTIR and FT-Raman spectra of metronidazole were recorded in the regions 4000-400cm and 4000-400cm respectively. Spectroscopic Study of 161,163 Er in Deformed Hartree-Fock Theory. BB Sahu, SK Singh, SK Patra, CR Praharaj, M Bhuyan, Z Naik, SK Ghorui. Acta Physica Polonica-Series B Elementary Particle Physics 43 (3), 451, 2012. 6. 2012. Shell-model method for Gamow-Teller transitions in heavy deformed odd-mass nuclei. LJ Wang, Y Sun, SK Ghorui. Physical Review C 97 (4), 044302, 2018. Multiconfiguration Dirac-Hartree-Fock Calculations with Spectroscopic Accuracy: Applications to Astrophysics. Atomic data, such as wavelengths, spectroscopic labels, broadening parameters, excitation and transition rates, are necessary for many applications, especially in plasma diagnostics, and for interpreting laboratory and astrophysical spectra [1,2]. Plasma diagnostics are commonly applied to measure the physical state of the plasma, e.g., temperatures, densities, ion and chemical abundances. The range of ions, the targeted configurations and the number of studied states for each sequence are summarized in Table 5. Calculations were done by parity, i.e., odd and even parity states were treated in separate sets of calculations.