SUBHENDU RAJBANSHI

I. **Name:** Subhendu Rajbanshi
Gender: Male
Date of writing the CV: 10.06.2018

II. **Date & Place of birth:** 17.03.1987, Nabadwip, Nadia, W. B., India
Citizenship: Indian
Contact details: Mobile: +919007027415 / +918240382875
E-mail: subhendu.physics@presiuniv.ac.in / subhphy@gmail.com

Assistant Professor
Presidency University
86/1 College Street
Kolkata 700073

III. Education and degree awarded

Degree	University/Institution	Year
Ph. D ***Dissertation title*:** **"Generation of Angular Momentum for Weakly Deformed Nuclei in Mass~140 Region"**	**University of Calcutta, Kolkata, W. B, India**	**2016**
Post. M. Sc. ***Dissertation title*:** **"Deep Inelastic reactions using γ-ray spectroscopy"**	**Saha Institute of Nuclear Physics, Kolkata, W. B, India**	**2011**
Master of Science	**University of Kalyani, Kalyani, W. B, India**	**2010 (*First Class in Physics, Stand IInd in University)***
Bachelor of Science	**University of Kalyani, Kalyani, W. B, India**	**2008 (*First Class in Physics, Stand IIInd in University)***

IV. Teaching Experience

- **Assistant Professor** — **August 2018 –To date**
  Department of Physics, **Presidency University**
  Kolkata - 700073, W. B, India

- **Assistant Professor** — **March 2015 – August 2018**
  Department of Physics, **Dum Dum Motijheel College**
  Dum Dum, Kolkata - 700074, W. B, India

- **Visiting Research Fellow** **2015- To date**
  Saha Institute of Nuclear Physics, Kolkata

V. Research expertise

I. Measurement of the sub-picosecond level lifetimes through the **Doppler Shift Attenuation Method (DSAM)** and extraction of the level lifetimes from **LINESHAPE** analysis to the experimental spectrum of the DSAM technique.

II. Experience on beam-line setting, setting up the electronics and data acquisition at different accelerator centre's **(VECC, Kolkata and TIFR, Mumbai)** for both Nuclear Structure and Reaction studies.

III. Analysis of experimental data by the RADWARE, INGASORT, DAMM and LINESHAPE software packages and subsequent interpretation of the experimental results with the help of the different theoretical models (calculations) viz. shell model (NushellX), shears model, shears mechanism with the principal axis cranking (SPAC) model and total routhian surface (TRS) calculations.

VI. Award, Fellowship and Grant received

a) **Junior Research Fellowship, CSIR** **2010-2012**

b) **Senior Research Fellowship, CSIR** **2012-2015**

c) **Minor Research project, UGC** **2017-2019**
Title of the project: Search for chiral symmetry breaking in atomic nuclei in mass A ~ 140 region

VII. Technical and Software skills

- Coincidence measurements
  Directional angular Correlation of gamma rays from Oriented nuclei (DCO ratio)
  Polarization Measurements
- Measurement of the sub picosecond level lifetime using Doppler Shift Attenuation Method with the help of the LINESHAPE software package
  Details study about the analysis procedures and also about the LINESHAPE software package
  Lifetime measurement from time stamped decay data
- Shell Model calculations (NushellX)
  Shears Model
  SPAC (the shears mechanism with the principal axis cranking) model
  HSPAC model (hybrid SPAC model)
  TRS (Total routhian surface) calculations
  QTR (quasiparticle plus triaxial rotor) calculations
- Programming languages: C, C++, Python and root (preliminary)
  Mathematical packages: Origin, Matlab, Mathematica, GEANT4, Qtplot and Gnuplot
  Other: Linux (Fedora, Ubuntu and Scientific Linux), Windows OS

VIII. Talk delivered (Selected)

- "Nuclear Batteries: Energy from Radioactivity" on the 68th OP (2018) at HRDC, Jadavpur University
- "Exploration of the possible general mode of excitation in the weakly deformed nuclei" at TIFR, Mumbai (October 2017)
- "Nuclear Structure at extreme excitation energy" at the Departmental Seminar (2015), Dum Dum Motijheel College

- "Observation of Shears Mechanism in ^{143}Eu" Young Physicist's colloquium (2015)
- 57th, 59th & 61th DAE-BRNS Symposium on Nuclear Physics (**2012, 2014 & 2016)**

IX. Summary of Research Work

My research work evolved to investigate the extreme excitation mechanism for generation of angular momentum states in weakly deformed nuclei near the shell closure, especially in mass A ~ 140 region, using the γ - ray spectroscopic techniques at different accelerator centre's with the state of art large gamma detectors arrays. One of the main motivation of my Ph. D. dissertation was investigate whether Shears Mechanism (Magnetic and Antimagnetic Rotation) is a general phenomenon of generating angular momentum in atomic nuclei near shell closure or not. The observation of the existence of phenomena of the Magnetic and Antimagnetic Rotation in a single nucleus (^{143}Eu) in mass A ~ 140 region, outside the A ~ 100 region, establishes the shears mechanism as an alternative mechanism for generation of high angular momentum states in weakly-deformed atomic nuclei. Lifetime measurement of the excited states of interest plays one of the key roles of the investigation. Different techniques, such as Doppler Shift Attenuation Method (DSAM), have been applied to measure the precise level lifetime. I have also measured the level lifetime of the levels in the range of nanosecond using time stamped decay data. The spin and parity of the states has been assigned from DCO ratio, ADO ratio, polarization and angular distribution measurements. Out of the several investigations related to the nuclear structure physics some selected work can be summarized as:

- Possibility of magnetic rotation due to attractive interaction in the island of the Shears Mechanism in A ~ 140 mass region
  S. Rajbanshi, **arXiv:1712.00353v1 [nucl-th] &** Submitted to Phys. Rev. C
- Abrupt phase change of the core rotation in ^{143}Sm
  S. Rajbanshi et al., arXiv:1710.10019 [nucl-ex] & submitted to Phys. Lett. B
- Shears mechanism and development of collectivity in ^{141}Sm
  S. Rajbanshi et al., Phys. Rev. C 94, 044318 (2016)
- Shears Mechanism in ^{143}Eu
- Proton aligned multiple Magnetic Rotational bands
  S. Rajbanshi et al., Phys. Rev. C 90, 024318 (2014)
- Antimagnetic Rotational bands
  S. Rajbanshi et al., Phys. Lett. B 748, 387 (2015)
- Shape Coexistence in ^{142}Sm
  S. Rajbanshi et al., Phys. Rev. C 89, 014315 (2014)
- Exploring the origin of Nearly Degenerate Doublet Bands in ^{106}Ag
  PHYSICAL REVIEW LETTERS 112, 202503 (2014)

X. Other Collaborative & Technical work

During the course, I have become interested to understand origin of different excitation mechanisms of atomic nuclei results from the underlying properties of many-body nuclear interactions along with the octupole deformed shape in atomic nuclei. In fact, I am a member of the active collaboration for searching the octupole correlation in atomic nuclei in mass 120 region and have been performed recently an experiment to explore the same in Cs nuclei. I am actively participated to the experiments to explore the reaction mechanisms near and below the coulomb barrier region.

Beside this, I have good experience to analyze the experimental data by the **RADWARE, INGASORT, DAMM and LINESHAPE** software packages along with the experience **on beam-line setting, setting up the electronics and data acquisition at different accelerator centre's** (VECC, Kolkata and TIFR, Mumbai) in India.

XI. Publication

- **In peer reviewed Journals**

Year 2018

1. [Principal and Corresponding Author] :

Abrupt phase change of the core rotation in ^{143}Sm :
Physics Letters B 782 (2018) 143 - 148
S. Rajbanshi, R. Raut, H. Pai, Sajad Ali, A. Goswami, G. Gangopadhyay, S. Bhattacharyya, G. Mukherjee, S. Muralithar, R. P. Singh, M. Kumar Rajug, P. Singh, R. K. Bhowmik

2. [**Collaborative Author**] :

Excited negative parity bands in ^{160}Yb :
Phys. Scr. 93 (2018) 034001 (6pp)
A Saha, T Bhattacharjee, D Curien, I Dede, K Mazurek, S R Banerjee, **S Rajbanshi**, A Bisoi, G de Angelis, Soumik Bhattacharya, S Bhattacharyya, S Biswas, A Chakraborty, S Das Gupta, B Dey, A Goswami, D Mondal, D Pandit, R Palit, T Roy, R P Singh, M Saha Sarkar, S Saha and J Sethi

Year 2017

3. [**Single Author**] :

Possibility of magnetic rotation due to attractive interaction in the island of the Shears Mechanism in A ~ 140 mass region :
arXiv:1712.00353v1 [nucl-th]
S. Rajbanshi

4. [Principal and Corresponding Author] :

Abrupt phase change of the core rotation in ^{143}Sm :
arXiv:1710.10019v1 [nucl-ex]
S. Rajbanshi, R. Raut, H. Pai, Sajad Ali, A. Goswami, G. Gangopadhyay, S. Bhattacharyya, G. Mukherjee, S. Muralithar, R. P. Singh, M. Kumar Rajug, P. Singh, R. K. Bhowmik

5. [**Collaborative Author**] :

Evidence of antimagnetic rotation in an odd-odd nucleus: The case of ^{142}Eu :
PHYSICAL REVIEW C 96, 021304(R) (2017)
Sajad Ali, **S. Rajbanshi**, B. Das, S. Chattopadhyay, M. Saha Sarkar, and A. Goswami, R. Raut, Abhijit Bisoi, Somnath Nag, S. Saha, J. Sethi, and R. Palit, G. Gangopadhyay, T. Bhattacharjee, S. Bhattacharyya, and G. Mukherjee, A. K. Singh, T. Trivedi

6. [**Collaborative Author**] :

Evidence of antimagnetic rotation in an odd-odd nucleus: The case of ^{142}Eu :
arXiv:1707.04417v1 [nucl-ex]
Sajad Ali, **S. Rajbanshi**, B. Das, S. Chattopadhyay, M. Saha Sarkar, and A. Goswami, R. Raut, Abhijit Bisoi, Somnath Nag, S. Saha, J. Sethi, and R. Palit, G. Gangopadhyay, T. Bhattacharjee, S. Bhattacharyya, and G. Mukherjee, A. K. Singh, T. Trivedi

7. [Collaborative Author] :

Shape evolution with increasing angular momentum in the ^{66}Ga nucleus :
PHYSICAL REVIEW C 95, 054330 (2017)
S. S. Bhattacharjee, R. P. Singh, S. Muralithar, Indu Bala, R. Garg, **S. Rajbanshi**, D. Singh, A. Dhal, M. Kumar Raju, S. Saha, J. Sethi, and R. Palit

8. [Collaborative Author] :

Novel evolution of the positive parity shears band in ^{106}Ag :
PHYSICAL REVIEW C 95, 051301(R) (2017)
B. Das, N. Rather, P. Datta, S. Chattopadhyay, **S. Rajbanshi**, A. Goswami, S. Roy, S. Pal, R. Palit, S. Saha, J. Sethi, S. Biswas, P. Singh, and H. C. Jain

Year 2016

9. [Principal Author] :

Shears mechanism and development of collectivity in ^{141}Sm :
PHYSICAL REVIEW C 94, 044318 (2016)
S. Rajbanshi, Sajad Ali, Abhijit Bisoi, Somnath Nag, S. Saha, J. Sethi, T. Bhattacharjee, S. Bhattacharyya, S. Chattopadhyay, G. Gangopadhyay, G. Mukherjee, R. Palit, R. Raut, M. Saha Sarkar, A. K. Singh, T. Trivedi, and A. Goswami

10. [Collaborative Author] :

Three proton hole structure in ^{106}Ag :
PHYSICAL REVIEW C 93, 064322 (2016)
B. Das, N. Rather, P. Datta, S. Chattopadhyay, **S. Rajbanshi**, A. Goswami, S. Roy, S. Pal, R. Palit, S. Saha, J. Sethi, S. Biswas, P. Singh, and H. C. Jain

11. [Collaborative Author] :

Probing the fusion of ^{7}Li with ^{64}Ni at near-barrier energies
PHYSICAL REVIEW C 93, 044616 (2016)
Md. Moin Shaikh, Subinit Roy, **S. Rajbanshi**, A. Mukherjee, M. K. Pradhan, P. Basu, V. Nanal, S. Pal, A. Shrivastava, S. Saha, and R. G. Pillay

Year 2015

12. [Principal Author] :

Antimagnetic rotation and sudden change of electric quadrupole transition strength in ^{143}Eu
Physics Letters B 748 (2015) 387–391
S. Rajbanshi, Abhijit Bisoi, Somnath Nag, S. Saha, J. Sethi, T. Bhattacharjee, S. Bhattacharyya, S. Chattopadhyay, G. Gangopadhyay, G. Mukherjee, R. Palit, R. Raut, M. Saha Sarkar, A. K. Singh, T. Trivedi, and A. Goswami

13. [Principal Author] :

Antimagnetic rotation and sudden change of electric quadrupole transition strength in ^{143}Eu
arXiv:1505.06074v1 [nucl-ex]
S. Rajbanshi, Abhijit Bisoi, Somnath Nag, S. Saha, J. Sethi, T. Bhattacharjee, S. Bhattacharyya, S. Chattopadhyay, G. Gangopadhyay, G. Mukherjee, R. Palit, R. Raut, M. Saha Sarkar, A. K. Singh, T. Trivedi, and A. Goswami

14. [Collaborative Author] :

Barrier distribution functions for the system ^{6}Li + ^{64}Ni and the effect of channel coupling
PHYSICAL REVIEW C 91, 034615 (2015)
Md. Moin Shaikh, Subinit Roy, **S. Rajbanshi**, A. Mukherjee, M. K. Pradhan, P. Basu, V. Nanal, S. Pal, A. Shrivastava, S. Saha, and R. G. Pillay

Year 2014

15. [Principal Author] :

Multiple magnetic rotational bands based on proton alignment in ^{143}Eu :
PHYSICAL REVIEW C 90, 024318 (2014)

S. Rajbanshi, Sajad Ali, Abhijit Bisoi, Somnath Nag, S. Saha, J. Sethi, T. Bhattacharjee, S. Bhattacharyya, S. Chattopadhyay, G. Gangopadhyay, G. Mukherjee, R. Palit, R. Raut, M. Saha Sarkar, A. K. Singh, T. Trivedi, and A. Goswami

16. [Principal Author] :

Shape coexistence in the near-spherical ^{142}Sm nucleus :
PHYSICAL REVIEW C 89, 014315 (2014)
S. Rajbanshi, Sajad Ali, Abhijit Bisoi, Somnath Nag, S. Saha, J. Sethi, T. Bhattacharjee, S. Bhattacharyya, S. Chattopadhyay, G. Gangopadhyay, G. Mukherjee, R. Palit, R. Raut, M. Saha Sarkar, A. K. Singh, T. Trivedi, and A. Goswami

17. [Collaborative Author] :

Exploring the Origin of Nearly Degenerate Doublet Bands in ^{106}Ag
PHYSICAL REVIEW LETTERS 112, 202503 (2014)
N. Rather, P. Datta, S. Chattopadhyay, **S. Rajbanshi**, A. Goswami, G. H. Bhat, J. A. Sheikh, S. Roy, S. Pal, R. Palit, S. Saha, J. Sethi, S. Biswas, P. Singh, and H. C. Jain

18. [Collaborative Author] :

Investigation of ^{6}Li + ^{64}Ni fusion at near barrier energies
PHYSICAL REVIEW C 90, 024615 (2014)
Md. Moin Shaikh, Subinit Roy, **S. Rajbanshi**, A. Mukherjee, M. K. Pradhan, P. Basu, V. Nanal, S. Pal, A. Shrivastava, S. Saha, and R. G. Pillay

Year 2013

19. [Collaborative Author] :

Band structures and intruder $\pi i_{13/2}$ state in ^{197}Tl
PHYSICAL REVIEW C 88, 064302 (2013)
H. Pai, G. Mukherjee, S. Bhattacharya, C. Bhattacharya, S. Bhattacharyya, T. Bhattacharjee, S. Chanda, **S. Rajbanshi**, A. Goswami, M. R. Gohil, S. Kundu, T. K. Ghosh, K. Banerjee, T. K. Rana, R. Pandey, G. K. Prajapati, S. R. Banerjee, S. Mukhopadhyay, D. Pandit, S. Pal, J. K. Meena, P. Mukhopadhyay, and A. Choudhury

- **In Symposium/Conference Proceedings**

Year 2018

1. **S. Rajbanshi** *et al.,* "Possibility of Wobbling excitation in the even-even 142Gd nucleus"**, Frontiers in Gamma ray spectroscopy FIG18, TIFR, Mumbai (2018)**
2. **S. Rajbanshi**, "Nuclear batteries: Energy from radioactivity"**, 68th OP, HRDC, Jadavpur University (2018)**

Year 2017

3. **S. Rajbanshi in** *Sajad Ali et al.,* "Assignment of multipolarity for ΔI = 0 γ-transitions from Polarization measurements"**, Proceedings of the DAE Symp. on Nucl. Phys. 62 (2017) 196, Thapar University, Patiala, Punjab**
4. **S. Rajbanshi in** *Prithwijita Ray et al.,* "Lifetime measurement for a dipole band in ^{142}Eu"**, Proceedings of the DAE Symp. on Nucl. Phys. 62 (2017) 272, Thapar University, Patiala, Punjab**
5. **S. Rajbanshi in** *Sajad Ali et al.,* "Fabrication of ^{112}Sn target on ^{208}Pb-backing"**, Proceedings of the DAE Symp. on Nucl. Phys. 62 (2017) 1132, Thapar University, Patiala, Punjab**

Year 2016

6. **S. Rajbanshi, "**Generation of angular momentum for weakly deformed nuclei in mass ~ 140 region"**, Proceedings of the DAE Symp. on Nucl. Phys. 61 (2016) 1110, Saha Institute of Nuclear Physics, Kolkata [Thesis Presentation]**
7. **S. Rajbanshi in** *Sajad Ali et al.,* "Search for unobserved transitions in ^{142}Eu"**, Proceedings of the DAE Symp. onNucl. Phys. 61 (2016) 212, Saha Institute of Nuclear Physics, Kolkata**

8. **S. Rajbanshi in** *B. Das et al.*, **"**Continuous evolution from quasi-particle excitation mode to collective excitation study of +ve parity band in ^{106}Ag nucleus", **Proceedings of the DAE Symp. on Nucl. Phys. 61 (2016) 98, Saha Institute of Nuclear Physics, Kolkata**
9. **S. Rajbanshi in** *M. Shaikh et al.*, **"**Comparison of fusion barrier distribution for ^{7}Li + ^{64}Ni and ^{6}Li + ^{64}Ni systems", **Proceedings of the DAE Symp. onNucl. Phys. 61 (2016) 488, Saha Institute of Nuclear Physics, Kolkata**

Year 2015

10. **S. Rajbanshi in** *M. Shaikh et. al.*, **"**Fusion excitation function measurement for system ^{6}Li + ^{64}Ni at near barrier energies**". European Physical Journal Web Conferences 86, 00044 (2015)**
11. **S. Rajbanshi,** "Observation of Shears mechanism in ^{143}Eu", **The 33rd Young Physicists Colloquium (YPC - 2015).**
12. **S. Rajbanshi in** *N. Rather et al.*, **"**High Spin Spectroscopy in ^{106}Ag", **Proceedings of the DAE Symp. onNucl. Phys. 60 (2015) 64, Sri Sathya Sai Institute of Higher Learning, Andhra Pradesh**
13. **S. Rajbanshi in** *B. Das et al.*, **"**Staircase bands in ^{105,107,109}Ag: Fingerprint of interplay between Shears Mechanism and Collective Rotation", **Proceedings of the DAE Symp. onNucl. Phys. 60 (2015) 82, Sri Sathya Sai Institute of Higher Learning, Andhra Pradesh**

Year 2014

14. **S. Rajbanshi *et al.*, "**Observation of the nearly degenerate doublet band in ^{143}Sm nucleus: Violation of the chiral symmetry", **Proceedings of the DAE Symp. onNucl. Phys. 59 (2014) 70, Banaras Hindu University, Varanasi.**
15. **S. Rajbanshi *et al.*, "**Effect of the clover geometry on the LINESHAPE analysis", **Proceedings of the DAE Symp. on Nucl. Phys. 59 (2014) 72, Banaras Hindu University, Varanasi.**
16. **S. Rajbanshi *et al.*, "**Magnetic Rotational band in ^{141}Sm nucleus", **Proceedings of the DAE Symp. onNucl. Phys. 59 (2014) 166, Banaras Hindu University, Varanasi.**
17. **S. Rajbanshi in** *A. Saha et al.*, **"**Evolution of collectivity in ^{160}Yb", **Proceedings of the DAE Symp. onNucl. Phys. 59 (2014) 268, Banaras Hindu University, Varanasi**
18. **S. Rajbanshi in** *M. Shaikh et al.*, **"**Investigation of fusion of ^{7}Li with ^{64}Ni around the coulomb barrier", **Proceedings of the DAE Symp. onNucl. Phys. 59 (2014) 322, Banaras Hindu University, Varanasi**

Year 2013

19. **S. Rajbanshi,** "Gamma-ray Polarization Sensitivity Measurement for INGA at TIFR", **National conference on INGA user workshop under DST Indian National Gamma Array Project at TIFR, Mumbai (2013).**
20. **S. Rajbanshi in** *A. Saha et al.*, **"**Spectroscopy of N = 90 ^{160}Yb", **Proceedings of the DAE Symp. onNucl. Phys. 58 (2013) 178, Bhabha Atomic Research Centre , Mumbai**
21. **S. Rajbanshi in** *M. Shaikh et al.*, **"**Measurement of fusion and quasi-elastic distributions of ^{7}Li + ^{64}Ni", **Proceedings of the DAE Symp. onNucl. Phys. 58 (2013) 358, Bhabha Atomic Research Centre, Mumbai**

Year 2012

22. **S. Rajbanshi *et al.*, "**Search for Shears Mechanism in ^{142}Sm", **Proceedings of the DAE Symp. on Nucl. Phys. 57 (2012) 208, University of Delhi, Delhi.**
23. **S. Rajbanshi *et al.*, "**Determination of nuclear life time from time stamped decay data", **Proceedings of the DAE Symp. on Nucl. Phys. 57 (2012) 244, University of Delhi, Delhi**

Awarded IInd prize for the poster presentation

24. **S. Rajbanshi in** *Dibyaduti Pramanik et al.*, **"**Competing collectivity and multiplet structure in ^{154}Ho", **Proceedings of the DAE Symp. on Nucl. Phys. 57 (2012) 212, University of Delhi, Delhi**

Year 2011

25. **S. Rajbanshi *et al.*, "**Observation of High-spin states in ^{153}Er**", Proceedings of the DAE Symp. on Nucl. Phys. 56 (2011) 720, Andhra University, Visakhapatnam**
26. **S. Rajbanshi** *T. Bhattacharjee et al.*, **"**Excited states of neutron rich ^{150}Pm using (p, ny) reaction**", Proceedings of the DAE Symp. on Nucl. Phys. 56 (2011) 358, Andhra University, Visakhapatnam**
27. **S. Rajbanshi***H. Pa et al.*, **"**Gamma ray spectroscopy of ^{197}Tl using α beam**", Proceedings of the DAE Symp. on Nucl. Phys. 56 (2011) 286, Andhra University, Visakhapatnam**

XII. School/Conference/Workshop Attended

- Frontiers in Gamma ray spectroscopy FIG 18, TIFR, Mumbai
- The 68th OP (2018) at HRDC, Jadavpur University
- Young Physicist's colloquium (2015), SINP, Kolkata
- 56th, 57th, 59th& 61th DAE-BRNS Symposium on Nuclear Physics, (**2011, 2012, 2014 & 2016)**
- Digital Pulse Processing Workshop **at Variable Energy Cyclotron Centre, (2013)**
- DST-SERC school on Nuclear Structure on High Angular Momentum and Isospin**, TIFR, (2014)**
- National Conference on Nuclear Dynamics and Nuclear Astrophysics at **University of Calcutta, (2013)**
- **International Workshop on** Future Plan with Radioactive ion beam (FPRIB 2012), **SINP (2012)**
- DST-SERC school on Modern Trends in Nuclear Structure and Dynamics, **IIT Roorkee, (2012)**

XIII. References

1. Prof. Asimananda Goswami (Ph. D. Supervisor)
   E-mail: asimananda.goswami@saha.ac.in
   Contact No: +919433051664

   Professor H
   Nuclear Physics Division
   Saha Institute of Nuclear Physics
   Kolkata - 700064

2. Dr. Sarmishtha Bhattacharyya
   E-mail: sarmi@vecc.gov.in
   Contact No: +919903122947

   Scientific Officer G
   Physics Group
   Variable Energy Cyclotron Centre
   Kolkata - 700064