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EDUCATION:

PhD	Astrophysics, Jadavpur University , Thesis: <i>X-ray Studies of Compact objects: Data Analysis, Development of Instruments and Their Characterisation.</i>	December 24, 2010. Kolkata, India.
MSc	Physics (spl. paper: Nuclear and particle physics) (obtained 1st Class), University of Kalyani ,	2004. Kalyani, India.
BSc	Physics (obtained 1st Class), Berhampur K. N. College (University of Kalyani),	2002. Berhampur, India.

Other Qualifications: NET (2004), GATE (2005), JEST (2004, 2005), PhD course work (2010).

DATE OF BIRTH:

September 15, 1981.

RESEARCH EXPERIENCE:

IASES Associate Professor	Kolkata, India. July 2022 – present.
<ul style="list-style-type: none">– Simulation of interaction of extraterrestrial particles and radiation with the Earth’s atmosphere and magnetosphere to study the space and atmospheric radiation environment.– Calculation of radiation dose in human body under different space and atmospheric radiation environment.	
ICSP Assistant Professor	Kolkata, India. January 2011 – August 2011 and September 2013 – June 2022.
<ul style="list-style-type: none">– Space exploration with small, light-weight and low-cost radiation detectors on board meteorological balloons.– Simulation of interaction of extraterrestrial particles and radiation with the Earth’s atmosphere and magnetosphere to study the space and atmospheric radiation environment.	
INFN, Trieste Foreign research associate	Trieste, Italy. May 2014 – present.

- Study of the proton structure through muon-nucleon interaction and hyperfine splitting of the muonic hydrogen energy state in FAMU project.

INFN, Trieste

Postdoctoral Fellow

Trieste, Italy.
September 2011 – August 2013.

- Simulation of a high energy cosmic γ ray and particle detector GAMMA-400, to quantify its capabilities and optimization of the detector model.
- Simulation and data analysis of Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics (PAMELA).

ICTP

Visiting scientist

Trieste, Italy.
July 2008 – June 2009 and January 2010 – December 2010.

- Simulation and data analysis of PAMELA experiment to optimize the simulation code, study of the self trigger method in the calorimeter and implementation of this method in the simulation code.
- Feasibility study of X-ray spectro-photometry from the moon by a small payload consisting multiple semiconductor detectors (in proposed SPHINX detector).

ICSP

Graduate Researcher

Kolkata, India.
April 2005 – June 2008.

- Development of the readout software system for the data from the RT-2 experiment.
- Simulation of X-ray detectors (LAXPC and CZT imager in ASTROSAT project, RT-2/S/G/CZT in RT-2 experiment, CSPOB and SPHINX) using Geant4 toolkit.
- Observational data analysis for the temporal and spectral properties of the X-ray emitting binary sources using RXTE and XMM Newton data.
- Development of the experimental facility in the laboratory to test the X-ray imaging using zone plates with long quasi-parallel X-ray beam.

SKILLS AND TECHNIQUES:

Programming skills in: C/C++, FORTRAN, Shell script, HTML/CSS, Python, etc.

Software skills in: GEANT4, ROOT, FTOOLS, SAS (XMM Newton), MySQL, SOLIDWORKS, etc.

RECENT RESEARCH ACTIVITIES:

- Monte Carlo simulation of radiation and particles interaction of astrophysical and cosmic origins with Earth's atmosphere and magnetosphere to understand the space and atmospheric radiation environment at various location and altitude. This procedure is also used to compute and explain the radiation detected with the balloon borne detectors.
- New measurement of the proton radius using muonic atom interactions through hyperfine splitting of the muonic hydrogen energy state in FAMU project.
- Simulation (mainly using Geant4 simulation toolkit) of various radiation detectors to optimize their construction and efficiency and to characterize their operation.
- Development of balloon borne radiation and particle detectors for the purpose of radiation measurement through the Earth atmosphere up to about 35 – 40 km. Development and test of light weight and low cost detectors using scintillators (single crystal and phoswich combination), proportional and Geiger-Müller counters.

- Payload construction and development of ancilliary sensors like payload attitude measurement (using MEMS type IMUs), GPS units, payload location transceiver, pressure and temperature sensors etc. Flying the payloads on board small meteorological balloons to attain the desired altitude above atmosphere to study X-ray radiation from various astrophysical sources and cosmic ray interaction with the atmosphere.
- Analysis of the data obtained from the balloon flight missions for the cosmic ray variations, solar flares, radiations from other bright X-ray sources and for other transient X-ray radiations like GRB, TGF etc. Analysis of the peripheral device data to supplement the main detector data analysis and to understand other atmospheric conditions.
- Simulation of a high energy cosmic gamma-ray and particle detector GAMMA-400, to quantify it's capabilities and optimization of the detector model.
- Data analysis, testing and optimization of detector performance of the Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics (PAMELA).

AWARDS AND ACHIEVEMENTS:

- **Outstanding poster award for young scientists, 1st place**, 3rd COSPAR Symposium, Jeju, South Korea, September 2017.
- **Fellowship for Training and Research in Italian Laboratories (TRIL)**, ICTP, Italy, July 2008 and January 2010.

SPONSORED PROJECTS:

1. PI of the project: *Low cost space exploration by weather balloon borne X-ray detector*, funded by Science and Engineering Research Board, India 2017–2020.

TEACHING EXPERIENCES:

- Guest lecturer at Narendrapur Ramkrishna Mission Residential College, M.Sc. 4th semester 2011, 2014–2017.
- Teaching in pre-PhD course in ICSP, Kolkata, 2018, 2021.

PHD SUPERVISION:

Supervised one PhD student (Thesis submitted for degree in May, 2022).

Name: Abhijit Roy

Thesis title: *Comprehensive Study of Cosmic Ray Interaction with Earth's Atmosphere by Monte Carlo Simulation and Small Balloon Borne Experiments*

PROJECT SUPERVISION:

Supervised the projects of five students for their post-graduate dissertation (2011, 2014, 2014, 2016, 2021).

PUBLICATIONS:

In Refereed Journals:

Name	Project Title	Year.
Surajit Bose	Designing a high voltage power supply for the study of a Geiger-Müller counter with different radioactive sources	2011
Biswanath Bag	Characterization of scintillator detectors for X-ray detection using radiation sources at different distances	2014
Rajashik Paul	Study of scintillator detector characteristics for X-ray detection using radiation sources at different angles	2014
Rajkumar Santra	Calibration and characterization of a phoswich detector and detection of extraterrestrial radiation using it	2016
Nirupam Roy	Calculation of geomagnetic field on and near the Earth's surface	2021

1. **Sarkar, R.**; Roy, A., 2021, *Monte Carlo Simulation of CRAND Protons Trapped at Low Earth Orbits*, AdSpRes, 69, 197–208.
2. Roy, A.; **Sarkar, R.**; Lee, C., 2021, *Extensive study of radiation dose on human body at aviation altitude through Monte Carlo simulation*, LSSR, 31, 1–13.
3. Roy, A.; **Sarkar, R.**; Chakrabarti, S. K., 2021, *Background model of phoswich X-ray detector on board small balloon*, AdSpRes, 68, 3052–3063.
4. Bhowmick, R.; Debnath, D.; Chatterjee, K.; Nagarkoti, S.; Chakrabarti, S. K.; **Sarkar, R.**; Chatterjee, D.; Jana, A., 2021, *Relation between Quiescence and Outbursting Properties of GX 339-4*, ApJ, 910, 8.
5. FAMU collaboration (with 55 co-authors), 2020, *The FAMU experiment: muonic hydrogen high precision spectroscopy studies*, EPJA, 56, 185–200.
6. **Sarkar, R.**; Roy, A.; Chakrabarti, S. K., 2020, *Simulation of cosmic rays in the Earth's atmosphere and interpretation of observed counts in an X-ray detector at balloon altitude near tropical region*, AdSpRes, 65, 189–197.
7. **Sarkar, R.**; Chakrabarti, S. K.; Bhowmick, D.; Bhattacharya, A.; Roy, A., 2019, *Detection of Crab radiation with a meteorological balloon borne phoswich detector*, Exp. Astrn., 47(3), 345–358.
8. Bhowmick, D.; Chakrabarti, S. K.; **Sarkar, R.**; Bhattacharya, A.; Rao, A. R., 2019, *Development of instruments for space exploration using meteorological balloons*, JATIS, 5(3), 036001.
9. FAMU collaboration (with 48 co-authors), 2018, *The FAMU experiment at RIKEN-RAL to study the muon transfer rate from hydrogen to other gases*, JINST, 13, 12033.
10. PAMELA collaboration (with 58 co-authors), 2018, *Lithium and Beryllium Isotopes with the PAMELA Experiment*, APJ, 862, 11.
11. **Sarkar, R.**; Chakrabarti, S. K.; Pal, P. S.; Bhowmick, D.; Bhattacharya, A., 2017, *Measurement of secondary cosmic ray intensity at Regener-Pfotzer height using low-cost weather balloons and its correlation with solar activity*, AdSpRes, 60, 991-998, DOI 10.1016/j.asr.2017.05.014.
12. Chakrabarti, S. K.; **Sarkar, R.**; Bhowmick, D.; Bhattacharya, A., 2017, *Study of high energy phenomena from near space using low-cost meteorological balloons*, Exp Astrn, 43(3), 311-338, DOI 10.1007/s10686-017-9540-7.
13. PAMELA collaboration (with 61 co-authors), 2017, *Geomagnetically trapped, albedo and solar energetic particles: Trajectory analysis and flux reconstruction with PAMELA*, AdSpRes, 60/4, 788-795.
14. PAMELA collaboration (with 58 co-authors), 2016, *PAMELA's measurements of geomagnetic cutoff variations during the 14 December 2006 storm*, SpWea, 14/3.
15. PAMELA collaboration (with 58 co-authors), 2016, *Measurements of Cosmic-Ray Hydrogen and Helium Isotopes with the PAMELA Experiment*, ApJ, 818/68.
16. PAMELA collaboration (with 59 co-authors), 2015, *Detection of a change in the North-South ratio of count rates of particles of high-energy cosmic rays during a change in the polarity of the magnetic field of the Sun*, JETP Letters, 101, 228-231.

17. PAMELA collaboration (with 59 co-authors), 2015, *Measurement of the large-scale anisotropy of cosmic rays in the PAMELA experiment*, JETP Letters, 101, 295-298.
18. PAMELA collaboration (with 59 co-authors), 2015, *New Upper Limit on Strange Quark Matter Abundance in Cosmic Rays with the PAMELA Space Experiment*, PhRvL, 115/11.
19. PAMELA collaboration (with 59 co-authors), 2015, *Search for Anisotropies in Cosmic-ray Positrons Detected By the PAMELA Experiment*, ApJ, 811/1, 9.
20. PAMELA collaboration (with 60 co-authors), 2015, *Time Dependence of the e^- Flux Measured by PAMELA during the July 2006-December 2009 Solar Minimum*, ApJ, 810/2, 13.
21. PAMELA collaboration (with 60 co-authors), 2015, *Force-field parameterization of the galactic cosmic ray spectrum: Validation for Forbush decreases*, AdSpR, 55/12, 2940-2945.
22. PAMELA collaboration (with 58 co-authors), 2015, *Reentrant albedo proton fluxes measured by the PAMELA experiment*, JGRA, 120/5, 3728-3738.
23. PAMELA collaboration (with 66 co-authors), 2015, *Pamela's Measurements of Magnetospheric Effects On High Energy Solar Particles*, ApJL, 801/1, 5.
24. PAMELA collaboration (with 60 co-authors), 2015, *Trapped Proton Fluxes at Low Earth Orbits Measured by the PAMELA Experiment*, ApJL, 799/1, 7.
25. PAMELA collaboration (with 62 co-authors), 2014, *The PAMELA Mission: Heralding a new era in precision cosmic ray physics*, Physics Reports, 544, 323-370.
26. PAMELA collaboration (with 63 co-authors), 2014, *Measurement of Boron and Carbon Fluxes in Cosmic Rays with the PAMELA Experiment*, ApJ, 791/2, 93.
27. PAMELA collaboration (with 59 co-authors), 2014, *New measurements of the energy spectra of high-energy cosmic-ray protons and helium nuclei with the calorimeter in the PAMELA experiment*, JETP, 119/3, 448-452.
28. PAMELA collaboration (with 64 co-authors), 2014, *Analysis on H spectral shape during the early 2012 SEPs with the PAMELA experiment*, NIMPRA, 742, 158-161.
29. PAMELA collaboration (with 61 co-authors), 2014, *Measurement of hydrogen and helium isotopes flux in galactic cosmic rays with the PAMELA experiment*, NIMPRA, 742, 273-275.
30. PAMELA collaboration (with 63 co-authors), 2013, *Precise cosmic rays measurements with PAMELA*, Acta Polytechnica, 53, 712-717.
31. PAMELA collaboration (with 58 co-authors), 2013, *Measurements of cosmic-ray proton and helium spectra with the PAMELA calorimeter*, AdSpRes, 51, 219-226.
32. PAMELA collaboration (with 66 co-authors), 2013, *The PAMELA space experiment*, AdSpRes, 51, 209-218.
33. PAMELA collaboration (with 64 co-authors), 2013, *Cosmic-Ray Positron Energy Spectrum Measured by PAMELA*, PhRvL, 111, 8.
34. PAMELA collaboration (with 60 co-authors), 2013, *North-south asymmetry for high-energy cosmic-ray electrons measured with the PAMELA experiment*, JETP, 117/2, 268-273.
35. PAMELA collaboration (with 61 co-authors), 2013, *Measurement of the Isotopic Composition of Hydrogen and Helium Nuclei in Cosmic Rays with the PAMELA Experiment*, ApJ, 770/1, 2.
36. PAMELA collaboration (with 63 co-authors), 2013, *Time Dependence of the Proton Flux Measured by PAMELA during the 2006 July-2009 December Solar Minimum*, ApJ, 765/2, 91.
37. PAMELA collaboration (with 68 co-authors), 2012, *Measurement of the Flux of Primary Cosmic Ray Antiprotons with Energies of 60 MeV to 350 GeV in the PAMELA Experiment*, JETP Letters, 96, 621-627.
38. PAMELA collaboration (with 64 co-authors), 2011, *Observations of the 2006 December 13 and 14 Solar Particle Events in the 80 MeV/n-3 GeV/n Range from Space with the PAMELA Detector*, ApJ, 742, 11.

39. PAMELA collaboration (with 63 co-authors), 2011, *The Discovery of Geomagnetically Trapped Cosmic-ray Antiprotons*, ApJL, 737, 5.
40. PAMELA collaboration (with 66 co-authors), 2011, *Cosmic-ray electron flux measured by the PAMELA experiment between 1 and 625 GeV*, PhRvL, 106.
41. PAMELA collaboration (with 64 co-authors), 2011, *PAMELA measurements of cosmic-ray Proton and Helium spectra*, Science, 332, 69.
42. RT2 collaboration (with 17 co-authors), 2011, *Onboard performance of the RT-2 detectors*, SoSyR, 45, 123.
43. **Sarkar, R.**; Mandal, S.; Debnath, D.; Kotoch, T. B.; Nandi, A.; Rao, A. R.; Chakrabarti, S. K., 2011, *Instruments of RT-2 Experiment onboard CORONAS-PHOTON and their test and evaluation IV: Background Simulations using GEANT-4 Toolkit*, Exp. Astrn., 29, 85–107.
44. Nandi, A.; Palit, S.; Debnath, D.; Chakrabarti, S. K.; Kotoch, T. B.; **Sarkar, R.**; Yadav, V. K.; Girish, V.; Rao, A. R.; Bhattacharya, D., 2011, *Instruments of RT-2 Experiment onboard CORONAS-PHOTON and their test and evaluation III: Coded Aperture Masks and Fresnel Zone Plates in RT-2/CZT Payload*, Exp. Astrn., 29, 55–84.
45. RT2 collaboration (with 19 co-authors), 2011, *Detection of GRB090618 by RT-2 Experiment onboard the Coronas-Photon Satellite*, ApJ, 728, 8.
46. **Sarkar, R.**; Chakrabarti, S. K., 2010, *Feasibility of Spectro-Photometry in X-rays (SPHINX) from the Moon*, Exp. Astrn., 28, 61.
47. PAMELA collaboration (with 65 co-authors), 2009, *Measurements of quasi-trapped electron and positron fluxes with PAMELA*, JGR:SP, 114, A12218.
48. Chakrabarti, S. K.; Palit, S.; Debnath, D.; Nandi, A.; Yadav, V.; **Sarkar, R.**, 2009, *Fresnel Zone Plate Telescopes for X-ray Imaging I: Experiments with a Quasi-parallel Beam*, Exp. Astrn., 24, 109–126.
49. Chakrabarti, S. K.; Nandi, A.; Debnath, D.; **Sarkar, R.**; Dutta, B. G., 2005, *Propagating Oscillatory Shock Model for QPOs in GRO J1655-40 During the March 2005 Outburst*, Ind. J. Phy., 78, 1–5.

Books or Chapters:

1. **Sarkar, R.**, 2018, *Detector Development and Optimization for Space Based Astronomy from Satellites and Balloons*, a chapter in *Exploring the Universe: From Near Space to Extra-Galactic*, Astrophysics and Space Science Proceedings, Springer International Publishing AG, part of Springer Nature, 53, 371.

In Proceedings:

1. **Sarkar, R.**; Chakrabarti, S. K.; Roy, A., 2021, *Measurement of Atmospheric Background Counts with X-ray Detector Onboard Small Scientific Balloons Near Tropical Region and its Interpretation Using Simulation of Cosmic Ray Interaction in the Atmosphere*, 43rd COSPAR Scientific Assembly; Abstract PSB.1-0031-21 (oral), id.2313.
2. Roy, A.; **Sarkar, R.**; Chakrabarti, S. K., 2021, *Simulation of space radiation effect on human body to study the induced radioactivity and radiation dose*, 43rd COSPAR Scientific Assembly; Abstract F2.2-0007-21 (oral), id.1847.
3. **Sarkar, R.**; Roy, A., 2021, *Study of CRAND Proton Radiation Belt Source Using Monte Carlo Simulation*, 43rd COSPAR Scientific Assembly; Abstract D3.5-0019-21 (oral), id.1148.
4. Roy, A.; **Sarkar, R.**; Chakrabarti, S. K., 2018, *Study of secondary cosmic ray through Extensive AirShower (EAS) simulation*, Proceedings of the DAE Symp. on Nucl. Phys., 63.
5. **Sarkar, R.**; Chakrabarti, S. K.; Bhowmick, D.; Bhattacharya, A., 2018, *Simulated radiation from Crab pulsar detected in a light-weight phoswich detector on board meteorological balloon*, 42nd COSPAR Scientific Assembly; Abstract id. PSB.1-12-18.

6. **Sarkar, R.**; Chakrabarti, S. K.; Roy, A., 2018, *Simulation study of cosmic ray interactions with earth magneto-atmosphere: measurement of different particle fluxes at satellite and balloon heights* , 42nd COSPAR Scientific Assembly; Abstract id. D2.4-32-18.
7. **Sarkar, R.**; Chakrabarti, S. K.; Bhowmick, D.; Bhattacharya, A., 2018, *Measurement of secondary cosmic rays at the Pfozter maximum and its correlation with solar activity near the Tropic of Cancer* , 42nd COSPAR Scientific Assembly; Abstract id. D2.4-33-18.
8. Chakrabarti, S. K.; **Sarkar, R.**; Bhowmick, D.; Bhattacharya, A., 2018, *On X-ray observation of extraterrestrial sources using light-weight detectors on board meteorological balloons*, 42nd COSPAR Scientific Assembly; Abstract id. PSB.1-27-18.
9. Bhowmick, D.; Chakrabarti, S. K.; **Sarkar, R.**; Bhattacharya, A., 2018, *Instrumental developments of the meteorological-balloon borne detectors for space exploration*, 42nd COSPAR Scientific Assembly; Abstract id. PSB.1-10-18.
10. Bhattacharya, A.; Chakrabarti, S. K.; **Sarkar, R.**; Bhowmick, D., 2018, *A light-weight device for payload attitude measurement using micro-electronic inertia-measurement unit suitable for small balloon borne missions*, 42nd COSPAR Scientific Assembly; Abstract id. PSB.1-15-18.
11. PAMELA collaboration (with 58 co-authors), 2016, *Features of re-entrant albedo deuteron trajectories in near Earth orbit with PAMELA experiment*, Proc. of the ICPPA-2015, J. Phy.: Conf. Ser., 675, 032007.
12. PAMELA collaboration (with 66 co-authors), 2016, *The May 17, 2012 solar event: back-tracing analysis and flux reconstruction with PAMELA* , Proc. of the ICPPA-2015, J. Phy.: Conf. Ser., 675, 032006.
13. PAMELA collaboration (with 58 co-authors), 2016, *The measurement of the dipole anisotropy of protons and helium cosmic rays with the PAMELA experiment*, Proc. of the ICPPA-2015, J. Phy.: Conf. Ser., 675, 032005.
14. PAMELA collaboration (with 58 co-authors), 2016, *Trapped positrons observed by PAMELA experiment* , Proc. of the ICPPA-2015, J. Phy.: Conf. Ser., 675, 032003.
15. PAMELA collaboration (with 60 co-authors), 2016, *H, He, Li and Be Isotopes in the PAMELA-Experiment*, Proc. of the ICPPA-2015, J. Phy.: Conf. Ser., 675, 032001.
16. PAMELA collaboration (with 59 co-authors), 2016, *The high energy cosmic ray particle spectra measurements with the PAMELA calorimeter*, Proc. of the 37th ICHEP, Nuc. and Part. Phy. Proc., 273, 275–281.
17. PAMELA collaboration (with 64 co-authors), 2016, *Deuteron spectrum measurements under radiation belt with PAMELA instrument*, Proc. of the 37th ICHEP, Nuc. and Part. Phy. Proc., 273, 2345–2347.
18. Chakrabarti, S. K.; Bhowmick, D.; **Sarkar, R.**; Bhattacharyya, A.; Midya, S., 2015, *Unique High Energy Experiment Initiative by ICSP with Weather Balloons*, Proc. of the 22nd ESA Symposium, 730, 557.
19. PAMELA collaboration (with 59 co-authors), 2015, *The large-scale anisotropy with the PAMELA calorimeter*, ASTRA Proceedings, 2, 35–37.
20. PAMELA collaboration (with 58 co-authors), 2015, *Search for a positron anisotropy with PAMELA experiment*, ASTRA Proceedings, 2, 17–20.
21. PAMELA collaboration (with 57 co-authors), 2015, *Measuring the spectra of high-energy cosmic-ray particles in the PAMELA experiment*, Materials of the 33rd NCCR, Bull. Russ. Acad. Sci. Phy., 79/3, 289-293.
22. PAMELA collaboration (with 64 co-authors), 2015, *Measuring the albedo deuteron flux in the PAMELA satellite experiment*, Materials of the 33rd NCCR, Bull. Russ. Acad. Sci. Phy., 79/3, 294-297.
23. PAMELA collaboration (with 60 co-authors), 2015, *Searching for anisotropy of positrons and electrons in the PAMELA experiment*, Materials of the 33rd NCCR, Bull. Russ. Acad. Sci. Phy., 79/3, 298-301.
24. GAMMA-400 collaboration (with 76 co-authors), 2015, *Study of the Gamma-ray performance of the GAMMA-400 Calorimeter*, 5th Int. Fermi Symp. Proc..
25. GAMMA-400 collaboration (with 66 co-authors), 2015, *Gamma-ray performance of the GAMMA-400 detector*, 5th Int. Fermi Symp. Proc..

26. PAMELA collaboration (with 59 co-authors), 2015, *Measurement of electron-positron spectrum in high-energy cosmic rays in the PAMELA experiment*, Proc. of the 24th ECRS, J. Phy.: Conf. Ser., 632/1, 012014.
27. PAMELA collaboration (with 59 co-authors), 2015, *PAMELA measurements of the boron and carbon spectra*, Proc. of the 24th ECRS, J. Phy.: Conf. Ser., 632/1, 012017.
28. PAMELA collaboration (with 59 co-authors), 2015, *Study of deuteron spectra under radiation belt with PAMELA instrument*, Proc. of the 24th ECRS, J. Phy.: Conf. Ser., 632/1, 012060.
29. PAMELA collaboration (with 59 co-authors), 2015, *Time variations of proton flux in Earth inner radiation belt during 23/24 solar cycles based on the PAMELA and the ARINA data*, Proc. of the 24th ECRS, J. Phy.: Conf. Ser., 632/1, 012069.
30. PAMELA collaboration (with 60 co-authors), 2015, *Solar modulation of GCR electrons over the 23rd solar minimum with PAMELA*, Proc. of the 24th ECRS, J. Phy.: Conf. Ser., 632/1, 012073.
31. PAMELA collaboration (with 61 co-authors), 2015, *The PAMELA experiment and cosmic ray observations*, Nuc. Part. Phy. Proc., 265–266, 242–244.
32. PAMELA collaboration (with 60 co-authors), 2015, *Solar modulation of galactic cosmic rays electrons and positrons over the 23rd solar minimum with the PAMELA experiment*, Proc. of the 34th ICRC, id.71.
33. PAMELA collaboration (with 66 co-authors), 2015, *Solar energetic particle events: trajectory analysis and flux reconstruction with PAMELA*, Proc. of the 34th ICRC, PoS(ICRC2015)085.
34. PAMELA collaboration (with 60 co-authors), 2015, *Lithium and Beryllium Isotopes in the PAMELA-Experiment*, Proc. of the 34th ICRC, id.269.
35. PAMELA collaboration (with 60 co-authors), 2015, *Measurement of the Isotopic Composition of Hydrogen and Helium Nuclei in Cosmic Rays with the PAMELA-Experiment*, Proc. of the 34th ICRC, id.270.
36. PAMELA collaboration (with 60 co-authors), 2015, *PAMELA's Measurement of Geomagnetic Cutoff Variations During Solar Energetic Particle Events*, Proc. of the 34th ICRC, PoS(ICRC2015)287.
37. PAMELA collaboration (with 60 co-authors), 2015, *PAMELA's Measurement of Geomagnetically Trapped and Albedo Protons*, Proc. of the 34th ICRC, PoS(ICRC2015)288.
38. PAMELA collaboration (with 65 co-authors), 2015, *Magnetospheric effects on high-energy solar particles during the 2012 May 17th event measured with the PAMELA experiment*, Proc. of the 34th ICRC, id.308.
39. PAMELA collaboration (with 58 co-authors), 2015, *Measurement of trapped and quasitrapped deuterons in PAMELA experiment*, Proc. of the 34th ICRC, id.333.
40. PAMELA collaboration (with 58 co-authors), 2015, *Nine years of cosmic rays investigation by the PAMELA experiment*, Proc. of the 34th ICRC.
41. PAMELA collaboration (with 59 co-authors), 2015, *Search for Spatial and Temporary Variations of Galactic Cosmic Ray Positrons in PAMELA Experiment*, Proc. of the Conf. of Fundamental Research and Particle Physics, Physics Procedia, 74, 302–307.
42. PAMELA collaboration (with 62 co-authors), 2015, *Splash and Re-entrant Albedo Fluxes Measured in the PAMELA Experiment*, Proc. of the Conf. of Fundamental Research and Particle Physics, Physics Procedia, 74, 314–319.
43. PAMELA collaboration (with 63 co-authors), 2015, *Solar Modulation of Galactic Cosmic Rays During 2006-2015 Based on PAMELA and ARINA Data*, Proc. of the Conf. of Fundamental Research and Particle Physics, Physics Procedia, 74, 347–351.
44. PAMELA collaboration (with 62 co-authors), 2014, *A method to detect positron anisotropies with Pamela data*, CRBTSM 2014. Cosmic Ray Origin — Beyond the Standard Models, Nuc. Phy. B (Proc. Supp.), 256, 173–178.
45. PAMELA collaboration (with 60 co-authors), 2014, *PAMELA: Mission Status and Future Analysis Development*, Proc. of the 14th ICATPP Conf., Astropart. Part. Sp. Phy. Det. Phy. Appl., 78–84.

46. PAMELA collaboration (with 60 co-authors), 2014, *Solar modulation of galactic protons and helium with the PAMELA experiment*, Proc. of the 14th ICATPP Conf., Astropart. Part. Sp. Phy. Det. Phy. Appl., 182–188.
47. GAMMA-400 collaboration (with 76 co-authors), 2015, *The GAMMA-400 mission*, Front. Obj. in Astroph. and Part. Phy. Proc., 58.
48. PAMELA collaboration (with 63 co-authors), 2014, *PAMELA mission: heralding a new era in cosmic ray physics*, 2nd Int. Conf. on New Front. in Phy., EPJ Web of Conf., 71, id.00115.
49. PAMELA collaboration (with 61 co-authors), 2014, *The PAMELA experiment and antimatter in the universe*, Hyperfine Interactions, Proc. of the 11th LEAP, 228, 101.
50. PAMELA collaboration (with 63 co-authors), 2014, *Results from the PAMELA space experiment*, Front. Obj. in Astroph. and Part. Phy. Proc., 58.
51. **Sarkar, R.**; Chakrabarti, S. K.; Palit, S.; Bhowmick, D.; Chakraborty, S., 2014, *Atmospheric effects on X-ray detectors at balloon heights*, 40th COSPAR scientific assembly, 40E, 2876S.
52. Chakrabarti, S. K.; **Sarkar, R.**; Bhowmick, D.; Chakraborty, S., 2014, *Unique Programme of Indian Centre for Space Physics using large rubber Balloons*, 40th COSPAR scientific assembly, 40E, 472C.
53. PAMELA collaboration (with 62 co-authors), 2013, *Spectra of primary cosmic-ray positrons and electrons in the PAMELA experiment*, Proc. of the 32nd All-Russ. Conf. CR, Bull. Russ. Aca. Sci. Phy., 77/11, 1309–1311.
54. PAMELA collaboration (with 66 co-authors), 2013, *PAMELA Observation of the 2012 May 17 GLE Event*, Proc. of the 33rd ICRC, GSFC-E-DAA-TN10635.
55. PAMELA collaboration (with 68 co-authors), 2013, *Study on 2012 March 7 Solar Particle Event and Forbush Decrease with the PAMELA Experiment*, Proc. of the 33rd ICRC, GSFC-E-DAA-TN10634.
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60. PAMELA collaboration (with 61 co-authors), 2013, *Cosmic Ray Study with the PAMELA Experiment*, Proc. of 23rd ECS, J. Phys.: Conf. Ser., 409, 012003.
61. PAMELA collaboration (with 64 co-authors), 2013, *A search algorithm for finding Cosmic-Ray anisotropy with the PAMELA calorimeter*, Proc. of 23rd ECS, J. Phys.: Conf. Ser., 409, 012029.
62. PAMELA collaboration (with 64 co-authors), 2013, *Galactic deuteron spectrum measured in PAMELA experiment*, Proc. of 23rd ECS, J. Phys.: Conf. Ser., 409, 012040.
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65. PAMELA collaboration (with 64 co-authors), 2013, *Measurement of antiproton flux in primary cosmic radiation with PAMELA experiment*, Proc. of 23rd ECS, J. Phys.: Conf. Ser., 409, 012056.

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67. PAMELA collaboration (with 68 co-authors), 2013, *Search for cosmic ray electron-positron anisotropies with the PAMELA data*, Proc. of 23rd ECS, J. Phys.: Conf. Ser., 409, 012155.
68. PAMELA collaboration (with 62 co-authors), 2013, *Cosmic ray electron and positron spectra measured with PAMELA*, Proc. of 23rd ECS, J. Phys.: Conf. Ser., 409, 012035.
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73. PAMELA collaboration (with 61 co-authors), 2013, *Multi-particle Analysis of the December 13th 2006 Forbush Decrease with PAMELA Experiment*, Proc. of the 33rd ICRC, 2013, 33, 1673.
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75. PAMELA collaboration (with 61 co-authors), 2013, *Hydrogen and Helium Isotopes Flux in Cosmic Rays with the PAMELA Experiment*, Proc. of the 33rd ICRC 2013, 33, 534.
76. PAMELA collaboration (with 63 co-authors), 2013, *Cosmic-Ray Positron Energy Spectrum measured with the PAMELA*, Proc. of the 33rd ICRC 2013, 33, 542.
77. PAMELA collaboration (with 61 co-authors), 2013, *Galactic boron and carbon fluxes measured by the PAMELA experiment*, Proc. of the 33rd ICRC 2013, 33, 468.
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86. PAMELA collaboration (with 62 co-authors), 2011, *Sub-cutoff electrons and positrons spectra measured with PAMELA*, Proc. of the 32nd ICRC 2011, 6, 25–28.

87. PAMELA collaboration (with 66 co-authors), 2011, *PAMELA: Measurements of matter and antimatter in space*, Il nuovo cimento C, Proc. of 8th SciNeGHE workshop 2010, 34/3, 79–87.
88. PAMELA collaboration (with 67 co-authors), 2010, *A method of pitch angle distribution reconstruction in PAMELA experiment*, 38th COSPAR Scientific Assembly, 38, 2.
89. PAMELA collaboration (with 68 co-authors), 2010, *Measurement of Cosmic-Ray Proton and Helium Spectra with the PAMELA calorimeter*, 38th COSPAR Scientific Assembly, 38, 2.
90. PAMELA collaboration (with 67 co-authors), 2010, *Search for antihelium in “PAMELA” experiment*, 38th COSPAR Scientific Assembly, 38, 2.
91. PAMELA collaboration (with 58 co-authors), 2009, *Latest results from PAMELA*, Proc. of the Galileo Galilei Inst. Conf. on Dark Matter and Dark Energy, Nuc. Phys. B-Proc. Suppl., 194, 123–128.
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95. **Sarkar, R.**; Mandal, S.; Nandi, A.; Chakrabarti, S. K.; Rao, A. R., 2008, *Background Simulation of X-ray Detectors Using Geant4 Toolkit*, Proc. of 25th ASI Meeting, 25, 83.
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SEMINAR, SCHOOLS AND CONFERENCE PRESENTATIONS:

Talks:

1. *Mars Mission*, Vivekananda College, Kolkata (virtual, January, 2022).
2. *Rovers on the Mars*, JBNSTS, Kolkata (virtual, September, 2021).
3. *Measurement of Atmospheric Background Counts with X-ray Detector Onboard Small Scientific Balloons Near Tropical Region and its Interpretation Using Simulation of Cosmic Ray Interaction in the Atmosphere*, 43rd COSPAR Scientific Assembly, Sydney, Australia (virtual, February, 2021).
4. *Study of CRAND Proton Radiation Belt Source Using Monte Carlo Simulation*, 43rd COSPAR Scientific Assembly, Sydney, Australia (virtual, February, 2021).
5. *Monte Carlo Simulation: Digitization and Physics*, FAMU collaboration meeting, Area Science Park, Trieste, Italy (July, 2019).
6. *Space exploration using light-weight payloads onboard meteorological balloons*, EXPUNIV2018, SNBNCBS, Kolkata, India (November, 2018).
7. *Simulated radiation from Crab pulsar detected in a light-weight phoswich detector on board meteorological balloon*, in 42nd COSPAR Scientific Assembly, Pasadena, USA (July, 2018).
8. *A light-weight device for payload attitude measurement using micro-electronic inertia measurement unit suitable for small balloon borne missions*, in 42nd COSPAR Scientific Assembly, Pasadena, USA (July, 2018).
9. *Instrumental developments of the meteorological balloon borne detectors for space exploration*, in 42nd COSPAR Scientific Assembly, Pasadena, USA (July, 2018).

10. *Low cost space exploration by Indian Centre for Space Physics*, Conference on Recent Advancements in Astrophysics and Space Science (CORASS 2018), Sidho Kanho Birsha University, India (March, 2018).
11. *Radiation Hazards: Cosmic Connection*, in Seminar on “Atmospheric Electricity Phenomena and Natural Hazards”, Department of Atmospheric Sciences, University of Calcutta, India (May, 2017).
12. *Low cost exploration of space using weather balloon borne X-ray detectors*, in 35th ASI meeting, Jaipur, India (March, 2017).
13. *Scaling the Universe in time and size*, at GH College, Gobardanga, W.B., India (September, 2016).
14. *Low Cost Exploration of Space by Indian Centre for Space Physics: Recent Technological Advancements*, in India international Science Festival, IIT Delhi, India (December, 2015).
15. *Atmospheric effects on X-ray detectors at balloon heights*, in 40th COSPAR Scientific Assembly, Moscow, Russia (August, 2014).
16. *A granular deep calorimeter for the GAMMA-400 experiment*, in TeV Particle Astrophysics, Mumbai, India (December, 2012).
17. *GAMMA 400 Simulation: study of the calorimeter*, in GAMMA 400 collaboration meeting, Florence, Italy (January, 2012).
18. *Evolution of Stars*, in District-wise Space Science Symposium (DSSS), Nadia, W.B., India (January, 2006).
19. *Simulation of Background Noise and Shielding Effect of LAXPC*, at TIFR, Mumbai, India (July, 2007).
20. *X-ray Observation of Swift J1753.5-0127 with RXTE and XMM Newton*, in Second Kolkata Conference on Observational Evidence of Black Holes in the Universe, Kolkata, India (February, 2008).
21. *Propagating Oscillatory Shock Model for QPOs in GRO J1655-40 During the March 2005 Outburst*, in Mini-school on Hydrodynamic and Radiative Processes in Astrophysics, Kolkata, India (February, 2007).

Poster:

1. *Measurement of secondary cosmic rays at the Pfozter maximum and its correlation with solar activity near the tropic of cancer*, by R. Sarkar, S. K. Chakrabarti, D Bhowmick and A. Bhattacharya in *42nd COSPAR Scientific Assembly, Pasadena, USA* (July, 2018).
2. *Simulation study of cosmic ray interactions with earth magneto-atmosphere: measurement of different particle fluxes at satellite and balloon heights*, by R. Sarkar, A. Roy and S. K. Chakrabarti in *42nd COSPAR Scientific Assembly, Pasadena, USA* (July, 2018).
3. *X-ray Observation of Extraterrestrial Sources Using Weather Balloons*, by R. Sarkar, S. K. Chakrabarti, D Bhowmick and A. Bhattacharya, in *3rd COSPAR Symposium, Jeju, South Korea* (September, 2017).
4. *A Novel Approach of Payload Attitude Measurement in Space Exploration Using Weather Balloon*, by R. Sarkar, S. K. Chakrabarti, D Bhowmick and A. Bhattacharya, in *3rd COSPAR Symposium, Jeju, South Korea* (September, 2017).
5. *Trend of Cosmic Ray Intensity with solar activity using low cost Meteorological balloons*, by R. Sarkar, S. K. Chakrabarti, P. S. Pal, D Bhowmick and A. Bhattacharya, in *3rd COSPAR Symposium, Jeju, South Korea* (September, 2017).
6. *Study of the Calorimeter Characteristics in GAMMA-400 Experiment*, by R. Sarkar, in *39th COSPAR Scientific Assembly, Mysore, India* (July, 2012).
7. *X-ray Observation of Swift J1753.5-0127 with RXTE and XMM Newton*, by R. Sarkar, A. Nandi, S. K. Chakrabarti, in *Second Kolkata Conference on Observational Evidence of Black Holes in the Universe, Kolkata, India* (February, 2008).
8. *Background Simulation of X-ray Detectors Using Geant4 Toolkit*, by R. Sarkar, S. Mandal, A. Nandi, S. K. Chakrabarti, A.R. Rao, in *25th Meeting of Astronomical Society of India, Hyderabad, India* (February, 2007).

ACADEMIC VISITS:

1. **Istituto Nazionale di Fisica Nucleare (INFN)**, Trieste, Italy, June-July 2019.
2. **Istituto Nazionale di Fisica Nucleare (INFN)**, Trieste, Italy, September 2018.
3. **SN Bose National Center for Basic Sciences**, Kolkata, India, August 2016.
4. **Istituto Nazionale di Fisica Nucleare (INFN)**, Trieste, Italy, September 2015.
5. **Tata Institute of Fundamental Research**, Mumbai, India, July 2015.
6. **The Abdus Salam International Centre for Theoretical Physics (ICTP) and Istituto Nazionale di Fisica Nucleare (INFN)**, Trieste, Italy, January – December 2010.
7. **The Abdus Salam International Centre for Theoretical Physics (ICTP) and Istituto Nazionale di Fisica Nucleare (INFN)**, Trieste, Italy, July 2008 – June 2009.
8. **Vikram Sarabhai Space Centre**, Thiruvananthapuram, India, March – April 2008.
9. **Tata Institute of Fundamental Research**, Mumbai, India, July 2007.
10. **Tata Institute of Fundamental Research**, Mumbai, India, October 2005.

OUTREACH ACTIVITIES:

- Organized and delivered lectures (mainly for the students of school and college level) at various places throughout the districts of West Bengal, India, under District-wise Space Science Symposium (DSSS) organised by Indian Centre for Space Physics, Kolkata, India 2006–2008.
- Organized and guided college level students in space exploration project through small balloon-borne payloads, under ICSP, Kolkata scientific ballooning project. 2019.
- Delivered lectures for popularization of science on invitation from various organizations.