

CURRICULUM VITAE

SOUROV ROY
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DEPARTMENT OF THEORETICAL PHYSICS
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EDUCATIONAL QUALIFICATIONS

Degree	Branch	College/University	Years Attended
B.Sc. (Hons.)	Physics	B.B. College, The University of Burdwan	1988 - 1991
M.Sc.	Physics	The University of Burdwan	1991 - 1993 (Results declared in 1994)
M.Phil.	Physics	Birla Institute of Technology and Science, Pilani	1995 - 1996
Ph.D	High Energy Physics	Harish-Chandra Research Institute, Allahabad (formerly known as Mehta Research Institute)	Degree obtained from Allahabad University on April 17, 2000

POST-DOCTORAL EXPERIENCE

- Worked as a Scientist at the Helsinki Institute of Physics, Finland from October 13, 2003 - August 31, 2006.
- Worked as a Post-doctoral Fellow at the Department of Physics, Technion - Israel Institute of Technology, Israel from October 12, 2001 - October 12, 2003.

- Worked as a Visiting Fellow at the Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai, India from August 20, 1999 - September 30, 2001.

PERSONAL INFORMATION

Date of Birth	December 7, 1970
Sex	Male
Citizenship	Indian
Current Position	Senior Professor at the Department of Theoretical Physics, IACS, Kolkata since September 1, 2016
Previous Position	Professor at the Department of Theoretical Physics, IACS, Kolkata from September 1, 2011 to August 31, 2016
Previous Position	Associate Professor at the Department of Theoretical Physics, IACS, Kolkata from September 1, 2006 to August 31, 2011
Marital Status	Married

TITLE OF Ph.D THESIS

Some studies on the Phenomenology of Supersymmetric Theories

NAME OF THESIS ADVISER

Prof. Biswarup Mukhopadhyaya, Harish-Chandra Research Institute, Allahabad

AREAS OF SPECIALIZATION

Physics beyond the Standard Model and in particular the phenomenology of Supersymmetric theories. Light sneutrino dark matter. Axino dark matter in R-parity violating theories. Sterile neutrino dark matter and X-ray observations. Phenomenology of non-universal gaugino masses. Sneutrino-antisneutrino oscillation and its implications in collider physics. *R*-parity violation with bilinear and trilinear lepton nonconserving interactions and their applications to collider processes and neutrino masses/mixings. Linear Collider signals of anomaly-mediated supersymmetry breaking and gauge-mediated supersymmetry breaking. Neutrino masses and mixing in $\mu\nu$ SSM. Neutrino non-standard interactions. Photon-axion mixing and its implications in cosmology and laboratory based experiments.

Worked also on neutrino masses and mixings in extra dimensional scenarios. Vacuum stability bounds in AMSB and gaugino-mediated supersymmetry breaking. Phenomenology

of extra gauge boson and neutrino masses/mixings in the context of gauged $L_\mu - L_\tau$ symmetry. Lepton flavour violation in the context of supersymmetry. Phenomenological aspects of split supersymmetry.

CALCULATION EXPERIENCE

Tree and one-loop analytical calculations. Linear Collider and hadron collider Monte Carlo calculations.

COMPUTATIONAL EXPERTISE

Programming in FORTRAN, Mathematica and symbolic computational packages like FORM. Familiar with the publicly available fortran codes SDECAY, HDECAY, HIGLU, SUSPECT, PROSPINO etc. and the computational package CALCHEP.

AWARDS/HONOURS/FELLOWSHIPS

- Honorary Associate Editor, Indian Journal of Physics.
- Affiliate of the Regional Center for Accelerator based Particle Physics (RECAPP), HRI, Allahabad.
- Visiting Scientist at the Excellence Cluster Universe and the Department of Physics, Technical University of Munich, Germany (June 2012).
- Visiting Scientist at the Korea Institute for Advanced Scientific Research (KIAS), Seoul, Korea (September 2012).
- Visiting Scientist in CERN, Geneva, Switzerland (October 2011).
- Visiting Scientist in NORDITA, Stockholm, Sweden (July 2008).
- Visiting Scientist in Helsinki Institute of Physics, Finland (in the year 2007, 2008, 2011, 2014).
- Visiting Scientist in the Abdus Salam International Centre for Theoretical Physics, Trieste, Italy (May 2006).
- Visiting Scientist at the Stanford Linear Accelerator Centre (SLAC), USA (September 2002).
- Offered Post-doctoral Fellowship at the Helsinki Institute of Physics, Finland for the year 2003-2004 (Accepted).
- Offered Post-doctoral Fellowship at the University of Liverpool, UK for the year 2003-2004.
- Offered Post-doctoral Fellowship at the National Tsing-Hua University, Taiwan for the year 2003-2004.
- Awarded Lady Davis Post-doctoral Fellowship at the Technion-IIT, Israel for the year 2002-2003.
- Offered Post-doctoral Fellowship at the Technion-IIT, Israel for the year 2001-2002 (Accepted).
- Offered INFN Post-doctoral Fellowship at the University of Rome for the year 2001-2002.
- Offered Post-doctoral Fellowship at the University of Würzburg, Germany for the year

2001-2002.

- Offered Post-doctoral Fellowship at the Concordia University, Montreal, Canada for the year 2001-2002.
- Junior Research Fellowship through National Eligibility Test (NET) by Council for Scientific and Industrial Research, New Delhi.
- Qualified in Graduate Aptitude Test in Engineering (GATE - 1994) in Physical Sciences.
- Received Gold Medal for securing First position in M.Sc. examination.

TEACHING EXPERIENCE

- Taught a course on “Mathematical Methods-II” in the programme “Integrated PhD in Physical Science” at IACS, Kolkata (Semester-II, 2016-17)
- Guest Faculty of the “Particle Physics and the Standard Model” course at the Preparatory SERC School on Theoretical High Energy Physics at IISER, Bhopal, India (July 2015).
- Guest Faculty of the “Particle Physics and the Standard Model” course at the Preparatory SERC School on Theoretical High Energy Physics at the Tezpur University, Assam, India (June-July 2013).
- Gave a twelve lecture course on “Particle Physics and the Standard Model” at the Preparatory SERC School on Theoretical High Energy Physics at the BITS Pilani, Goa Campus (November 2010).
- Taught a course on “Particle Physics and the Standard Model” in the Ph.D. programme at IACS, Kolkata (2007-2008, 2009, 2011)
- Guest Faculty of the “Particle Physics and the Standard Model” course at the Preparatory SERC School on Theoretical High Energy Physics at the Benaras Hindu University (BHU), Varanasi (December 2007).
- Worked as a teaching assistant in Ph.D. Programme at Harish-Chandra Research Institute (subjects include Quantum Mechanics, Mathematical Methods, Classical Electrodynamics and Classical Mechanics).

PROFESSIONAL SERVICE

- Worked as one of the coordinators of the Parallel Session “Supersymmetry models, String phenomenology and Formal Field theory (SUSYM)” in the 25th International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY17) at TIFR, Mumbai, India (December 11-15, 2017).

- Member of the National Organizing Committee (NOC), Workshop on High Energy Physics Phenomenology (WHEPP) XV, IISER Bhopal (December 14-23, 2017)
- Worked as one of the coordinators in “Neutrino Physics (WG5)” Working Group at WHEPP XIII, Puri, India (December 12-21, 2013).
- Member of the National Organizing Committee (NOC), XX DAE-BRNS High Energy Physics Symposium, Visva-Bharati University, Santiniketan, India
- Worked as one of the coordinators in “Neutrinos and Beyond Standard Model (WG3)” Working Group at WHEPP XI, PRL, Ahmedabad (January 2-12, 2010).
- Organized a 3-days Conference on Beyond the Standard Model Physics at the LHC (BSMLHC-2009), January 15–17, 2009, as a Joint Convenor at IACS, Kolkata
- Member of the local organizing committee of the “Instructional Workshop on the Large Hadron Collider (LHC) and Related Physics” at IISER, Kolkata (December 19 - 24, 2008).
- Moderator and a member of the Board of question paper setters in physics (in the year 2010 and 2011) for the written test for Senior Scholarship of Jagadis Bose National Science Talent Search (JBNSTS), Kolkata.
- Reviewed research papers for publication in JHEP, NPB, EPJC, MPLA, IJP.

A LIST OF Ph.D DEGREE RECIPIENTS:

Sl. No.	Name (Year)	Title of the Thesis	University (Department)	Supervisor
1.	Pradipta Ghosh (2012)	Exploring physics beyond the Standard Electroweak Model in the light of supersymmetry	Calcutta University (Physics)	Sourov Roy (Joint Supervisor)
2.	Subhadeep Mondal (2015)	Some studies on the prospect of finding new physics beyond the Standard Model at the LHC	Calcutta University (Physics)	Sourov Roy
3.	Sabyasachi Chakraborty (2016)	Some aspects of the phenomenology of supersymmetric theories and the Large Hadron Collider	Calcutta University (Physics)	Sourov Roy

NAMES OF REFEREES

- Prof. Biswarup Mukhopadhyaya, Harish-Chandra Research Institute, Chhatnag Road, Jhusi, Allahabad 211 019, India
E-mail : biswarup@hri.res.in
- Prof. Katri Huitu, Helsinki Institute of Physics, P.O. Box 64(Gustaf Hällströminkatu 2), FIN-00014 University of Helsinki, Finland
E-mail : huitu@mappi.helsinki.fi; Katri.Huitu@helsinki.fi
- Prof. Yuval Grossman, Institute for High Energy Phenomenology, Newman Laboratory of Elementary Particle Physics, Cornell University, Ithaca, NY 14853, USA
E-mail : yg73@cornell.edu
- Prof. Probir Roy, Center for Astroparticle Physics and Space Science, Bose Institute, Kolkata 700 091, India
E-mail : probirrana@gmail.com
- Prof. Alejandro Ibarra, Department of Physics, Technical University of Munich, Germany
E-mail : ibarra@tum.de

LIST OF PUBLICATIONS

1. Generation of a radiative neutrino mass in the linear seesaw framework, charged lepton flavor violation, and dark matter,
Arindam Das, Takaaki Nomura, Hiroshi Okada, **Sourov Roy**, Phys. Rev. D **96**, 075001 (2017).
2. Light top squarks in a $U(1)_R$ lepton number model with a right handed neutrino and the LHC,
Sabyasachi Chakraborty, Aseshkrishna Datta, Katri Huitu, **Sourov Roy** and Harri Waltari, Phys. Rev. D **93**, 075005 (2016).
3. Stability constraints in triplet extension of the MSSM,
Moumita Das, Stefano Di Chiara, **Sourov Roy**, Phys. Rev. D **91**, 055013 (2015).
4. $h \rightarrow \gamma\gamma$ in $U(1)_R$ -lepton number model with a right-handed neutrino,
Sabyasachi Chakraborty, Aseshkrishna Datta, **Sourov Roy**, JHEP **1502**, 124 (2015).
Erratum to: $h \rightarrow \gamma\gamma$ in $U(1)_R$ -lepton number model with a right-handed neutrino”,
Sabyasachi Chakraborty, Aseshkrishna Datta, **Sourov Roy**, JHEP **1509**, 077 (2015).
5. 7 keV sterile neutrino dark matter in $U(1)_R$ -lepton number model,
Sabyasachi Chakraborty, Dilip Kumar Ghosh, **Sourov Roy**, JHEP **1410**, 146 (2014).
Total number of citations is 41 as on April 23, 2018.

6. Higgs boson mass, neutrino masses and mixing and keV dark matter in an U(1)_R lepton number model,
Sabyasachi Chakraborty, **Sourov Roy**, JHEP **1401**, 101 (2014).
Total number of citations is 28 as on April 23, 2018.

7. Vacuum stability constraints on the minimal singlet TeV seesaw model,
Subrata Khan, Srubabati Goswami, **Sourov Roy**, Phys. Rev. D **89**, 073021 (2014).

8. Invisible Higgs Decay in a Supersymmetric Inverse Seesaw Model with Light Sneutrino Dark Matter,
Shankha Banerjee, P.S. Bhupal Dev, Subhadeep Mondal, Biswarup Mukhopadhyaya, **Sourov Roy**, JHEP **1310**, 221 (2013).
Total number of citations is 24 as on April 23, 2018.

9. Phenomenology of Light Sneutrino Dark Matter in cMSSM/mSUGRA with Inverse Seesaw,
P.S. Bhupal Dev, Subhadeep Mondal, Biswarup Mukhopadhyaya, **Sourov Roy**, JHEP **1209**, 110 (2012) (arXiv:1207.6542).
Total number of citations is 38 as on April 23, 2018.

10. Muon (g-2) from the bulk neutrino field in a warped extra dimensional model,
R.S. Hundi, **Sourov Roy**, Soumitra SenGupta, Phys.Rev. D **86**, 036014 (2012) (arXiv:1206.5137).

11. Four lepton flavor violating signals at the LHC,
Dilip Kumar Ghosh, Probir Roy, **Sourov Roy**, JHEP **1205**, 067 (2012) (arXiv:1203.0187).

12. Non-standard interaction in neutrino oscillations and recent Daya Bay, T2K experiments,
Rathin Adhikari, Sabyasachi Chakraborty, Arnab Dasgupta, **Sourov Roy**, Phys.Rev. D **86**, 073010 (2012) (arXiv:1201.3047).
Total number of citations is 23 as on April 23, 2018.

13. Exploring novel correlations in tripleton channels at the LHC for the minimal supersymmetric inverse seesaw model,
Subhadeep Mondal, Sanjoy Biswas, Pradipta Ghosh, **Sourov Roy**, JHEP **1205**, 134 (2012) (arXiv:1201.1556).

14. Constraints on Axino Warm Dark Matter from X-Ray Observation at the Chandra Telescope and SPI,
Paramita Dey, Biswarup Mukhopadhyaya, **Sourov Roy**, Sudhir K. Vempati, JCAP **1205**, 042 (2012) (arXiv:1108.1368).

15. Resonant Leptogenesis with nonholomorphic R-Parity violation and LHC Phenomenology,
Joydeep Chakraborty and **Sourov Roy**, Phys. Rev. **D85**, 035014 (2012)
(arXiv:1104.1387).
16. R-parity violating supersymmetric explanation for the CDF W_{jj} excess,
Dilip Kumar Ghosh, Manas Maity, **Sourov Roy**, Phys. Rev. **D84**, 035022 (2011)
(arXiv:1107.0649).
17. Sneutrino-antisneutrino oscillation at the Tevatron,
Dilip Kumar Ghosh, Tuomas Honkavaara, Katri Huitu, **Sourov Roy**, Phys. Rev. **D84**, 075001 (2011) (arXiv:1106.0601).
18. Constraints on composite Dirac neutrinos from observations of galaxy clusters,
R.S. Hundi, **Sourov Roy**, Phys. Lett. **B702**, (2011) 228 (arXiv:1105.0291).
19. Unusual Higgs boson signal in R-parity violating nonminimal supersymmetric models at the LHC,
Priyotosh Bandyopadhyay, Pradipta Ghosh, **Sourov Roy**, Phys. Rev. **D84**, 115022 (2011) (arXiv:1012.5762).
Total number of citations is 25 as on April 23, 2018.
20. Multi-photon signal in supersymmetry comprising non-pointing photon(s) at the LHC,
Sanjoy Biswas, Joydeep Chakraborty, **Sourov Roy**, Phys. Rev. **D83**, 075009 (2011)
(arXiv:1010.0949).
21. Ultrarelativistic sneutrinos at the LHC and sneutrino-antisneutrino oscillation,
Dilip Kumar Ghosh, Tuomas Honkavaara, Katri Huitu, **Sourov Roy**, Phys. Rev. **D82**, 115006 (2010) (arXiv:1005.1802).
22. One-loop contribution to the neutrino mass matrix in NMSSM with right-handed neutrinos and tri-bimaximal mixing,
Debottam Das and **Sourov Roy**, Phys. Rev. **D82**, 035002 (2010) (arXiv:1003.4381).
23. Radiative contribution to neutrino masses and mixing in $\mu\nu$ SSM,
Pradipta Ghosh, Paramita Dey, Biswarup Mukhopadhyaya, **Sourov Roy**, J. High Energy Phys. **05** (2010) 087 (arXiv:1002.2705).
Total number of citations is 39 as on April 23, 2018.
24. Neutrino masses and mixing, lightest neutralino decays and a solution to the μ -problem in supersymmetry,
Pradipta Ghosh and **Sourov Roy**, J. High Energy Phys. **04** (2009) 069
(arXiv:0812.0084).
Total number of citations is 62 as on April 23, 2018.

25. Correlations between sneutrinos oscillations and signatures at the LHC in anomaly-mediated supersymmetry breaking,
Dilip Kumar Ghosh, Tuomas Honkavaara, Katri Huitu, **Sourov Roy**, Phys. Rev. D**79**, 055005 (2009) (arXiv:0810.0913).
26. Search for Higgs bosons in SUSY cascades in CMS and dark matter with non-universal gaugino masses,
Katri Huitu, Ritva Kinnunen, Jari Laamanen, Sami Lehti, **Sourov Roy**, and Tapio Salminen, Eur. Phys. J. C**58**, 591 (2008) (arXiv:0808.3094)
Total number of citations is 34 as on April 23, 2018.
27. Constraining the Randall-Sundrum modulus in the light of recent PVLAS data,
Debaprasad Maity, **Sourov Roy**, and Soumitra SenGupta, Phys. Rev. D**77**, 015010 (2008) (arXiv:0709.3940).
28. Lepton flavour violation in future linear colliders in the long-lived stau NLSP scenario,
Alejandro Ibarra and **Sourov Roy**, J. High Energy Phys. **05** (2007) 059 (hep-ph/0606116).
29. Photon propagation in magnetic and electric fields with scalar/pseudoscalar couplings: A new look,
Emidio Gabrielli, Katri Huitu and **Sourov Roy**, Phys. Rev. D**74**, 073002 (2006) (hep-ph/0604143).
30. Signals of sneutrino-antisneutrino mixing in an $e^- \gamma$ collider in anomaly-mediated supersymmetry breaking,
Tuomas Honkavaara, Katri Huitu and **Sourov Roy**, Phys. Rev. D**73**, 055011 (2006) (hep-ph/0512277).
31. Phenomenology of non-universal gaugino masses in supersymmetric grand unified theories,
Katri Huitu, Jari Laamanen, Pran N. Pandita and **Sourov Roy**, Phys. Rev. D**72**, 055013 (2005) (hep-ph/0502100).
Total number of citations is 33 as on April 23, 2018.
32. Infrared fixed point of the top Yukawa coupling in split supersymmetry,
Katri Huitu, Jari Laamanen, Probir Roy and **Sourov Roy**, Phys. Rev. D**72**, 055002 (2005) (hep-ph/0502052).
33. Higher dimensional models of light Majorana neutrinos confronted by data,
JoAnne L. Hewett, Probir Roy and **Sourov Roy**, Phys. Rev. D**70**, 051903(R)(2004) (hep-ph/0404174).

34. Single sneutrino production at hadron colliders,
Masud Chaichian, Anindya Datta, Katri Huitu, **Sourov Roy** and Zenghui Yu, Phys. Lett. **B594** (2004)355 (hep-ph/0311327).
35. Light GUT triplets and Yukawa Splitting,
Subhendu Rakshit, Guy Raz, **Sourov Roy** and Yael Shadmi, Phys. Rev. **D69**, 095006(2004) (hep-ph/0309318).
36. Effective R-parity violation from supersymmetry breaking,
Shaouly Bar-Shalom and **Sourov Roy**, Phys. Rev. **D69**, 075004(2004) (hep-ph/0304170).
37. Signals of anomaly mediated supersymmetry breaking in an $e^- \gamma$ collider,
Debajyoti Choudhury, Dilip Kumar Ghosh and **Sourov Roy**, Nucl. Phys. **B646** (2002)3 (hep-ph/0208240).
38. Effects of initial axion production and photon-axion oscillation on type Ia supernova dimming,
Yuval Grossman, **Sourov Roy** and Jure Zupan, Phys. Lett. **B543** (2002)23 (hep-ph/0204216).
Total number of citations is 48 as on April 23, 2018.
39. Gauged $L_\mu - L_\tau$ with Large Muon Anomalous Magnetic Moment and the Bimaximal Mixing of Neutrinos,
Ernest Ma, D.P. Roy and **Sourov Roy**, Phys. Lett. **B525** (2002)101 (hep-ph/0110146).
Total number of citations is 76 as on April 23, 2018.
40. Vacuum stability bounds in anomaly and gaugino mediated SUSY breaking models,
Emidio Gabrielli, Katri Huitu and **Sourov Roy**, Phys. Rev. **D65**, 075005(2002) (hep-ph/0108246).
41. Single sneutrino production in $\gamma\gamma$ collisions,
Masud Chaichian, Katri Huitu, **Sourov Roy** and Zenghui Yu, Phys. Lett. **B518** (2001)261 (hep-ph/0107111).
42. Characteristic Wino signals in a linear collider from anomaly mediated supersymmetry breaking,
Dilip Kumar Ghosh, Anirban Kundu, Probir Roy and **Sourov Roy**, Phys. Rev. **D64**, 115001(2001) (hep-ph/0104217).
Total number of citations is 25 as on April 23, 2018.

43. Constraining Anomaly Mediated Supersymmetry Breaking Framework via Ongoing Muon $g - 2$ Experiment at Brookhaven,
Utpal Chattopadhyay, Dilip Kumar Ghosh and **Sourov Roy**, Phys. Rev. **D62**, 115001(2000) (hep-ph/0006049).
Topcite = 50+ (Total number of citations is 69 as on April 23, 2018).
44. Linear Collider Signal of a Wino LSP in Anomaly Mediated Scenarios,
Dilip Kumar Ghosh, Probir Roy and **Sourov Roy**, J. High Energy Phys. **08** (2000) 031 (hep-ph/0004127).
Total number of citations is 34 as on April 23, 2018.
45. Study of R-parity-violating Supersymmetric Signals at an e^-e^- collider,
Dilip Kumar Ghosh and **Sourov Roy**, Phys. Rev. **D63**, 055005(2001) (hep-ph/0003225).
46. Constraining an R-parity violating supersymmetric theory from the SuperKamiokande data on atmospheric neutrinos,
Aseshkrishna Datta, Biswarup Mukhopadhyaya and **Sourov Roy**, Phys. Rev. **D61**, 055006(2000) (hep-ph/9905549).
Topcite = 50+ (Total number of citations is 53 as on April 23, 2018).
47. Radiative decay of the lightest neutralino in an R-parity violating supersymmetric theory,
Biswarup Mukhopadhyaya and **Sourov Roy**, Phys. Rev. **D60**, 115012(1999) (hep-ph/9903418).
48. Correlations between neutrino oscillations and collider signals of supersymmetry in an R-parity violating model,
Biswarup Mukhopadhyaya, **Sourov Roy** and Francesco Vissani, Phys. Lett. **B443**, (1998)191 (hep-ph/9808265).
Topcite = 100+ (Total number of citations is 178 as on April 23, 2018).
49. Filtering out signals of gauge-mediated supersymmetry breaking: Can we always eliminate conventional supersymmetric effects ?,
Biswarup Mukhopadhyaya and **Sourov Roy**, Phys. Rev. **D57**, 6793(1998) (hep-ph/9709392).
50. Testing gauge-gravitino coupling in gauge-mediated supersymmetry breaking through single photon events,
Amitava Datta, Aseshkrishna Datta, Anirban Kundu, Biswarup Mukhopadhyaya and **Sourov Roy**, Phys. Lett. **B416**, (1998)117 (hep-ph/9707239).

51. Some implications of a supersymmetric model with R-parity breaking bilinear interactions,

Sourov Roy and Biswarup Mukhopadhyaya, Phys. Rev. D**55**, 7020(1997) (hep-ph/9612447).

Topcite = 100+ (Total number of citations is 143 as on April 23, 2018).

Average Citations per paper (from inSPIRE): 24.7 (See, <http://inspirehep.net/> and use the string *f ea roy, sourov* under Citesummary)

INVITED REVIEW ARTICLE

1. “Signatures of Supersymmetry at the LHC” (Invited Review Article), by Amitava Datta, Monoranjan Guchait and **Sourov Roy**, published in Monographs on “Physics at the Large Hadron Collider” - A Platinum Jubilee Special Issue of the Indian National Science Academy (INSA), Editors: A. Datta, B. Mukhopadhyaya and A. Rauchaudhari.
2. Invited by World Scientific Publishing Co Ltd to write a brief review on “Anomaly mediated supersymmetry breaking and its test in Linear Colliders” for publication in Mod. Phys. Lett. A (Mod. Phys. Lett. **A19**, (2004)83).

IN PROCEEDINGS :

1. Working group summary: Neutrinos and beyond standard model, Anjan S. Joshipura, Sourov Roy, S. Uma Sankar, proceedings of the XIth Workshop on High Energy Physics Phenomenology (WHEPP-XI), PRL, Ahmedabad, 5-15 January, 2011 Pramana **76**, (2011) 699-705.
2. Correlations between sneutrino-antineutrino oscillations and signatures at the LHC in anomaly-mediated supersymmetry breaking, Dilip Kumar Ghosh, Tuomas Honkavaara, Katri Huitu, **Sourov Roy**, proceedings of 17th International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY 09), Boston, Massachusetts, 5-10 Jun 2009, AIP Conf.Proc.1200:490-493,2010 (arXiv:0909.0632)
3. Constraints on the RS modulus using recent PVLAS data, **Sourov Roy**, Proceedings of the workshop on Physics of warped extra dimensions, pages 78-85 (Ed. by Sayan Kar), CTS, IIT-Kharagpur, 21 February - 23 February, 2008.

4. ILC Reference Design Report Volume 4 - Detectors. By ILC Collaboration (Ties Behnke, (Ed.) et al.). Dec 2007. e-Print: arXiv:0712.2356
5. ILC Reference Design Report: ILC Global Design Effort and World Wide Study. By ILC Collaboration (James Brau, (Ed.) et al.). Aug 2007. 147pp. e-Print: arXiv:0712.1950
6. Sneutrino-antisneutrino mixing at future colliders,
Tuomas Honkavaara, Katri Huitu, and **Sourov Roy**, Proceedings of 15th International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY07), Karlsruhe, Germany, 26 Jul - 1 Aug 2007. In ‘Karlsruhe 2007, SUSY 2007’, pages 322-325 (arXiv:0710.2207 [hep-ph])
7. Non-universal gaugino masses and implications on the dark matter and Higgs searches, Katri Huitu, Jari Laamanen, and **Sourov Roy**, Proceedings of 15th International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY07), Karlsruhe, Germany, 26 Jul - 1 Aug 2007. In ‘Karlsruhe 2007, SUSY 2007’, pages 914-917 (arXiv:0710.2058 [hep-ph])
8. Phenomenology of non-universal gaugino masses and implications for the Higgs boson decay,
Katri Huitu, Jari Laamanen, P.N. Pandita, and **Sourov Roy**, To appear in the Proceedings of the Linear Collider Workshop (LCWS06), Banagalore, India, March 9-13, 2006 (hep-ph/0607311), *Pramana* **69**, 819-822 (2007).
9. Radiative generation of R-parity violating Yukawa-like interactions from supersymmetry breaking,
Sourov Roy, published in the Proceedings of the XII International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY 04), June 17-23, 2004, Tsukuba, Japan (hep-ph/0409260).
10. Particle Physics Experiments at JLC, ACFA Linear Collider Working Group, Koh Abe *et al.*, KEK-REPORT-2001-11, hep-ph/0109166.
11. Linear collider signals of anomaly mediated supersymmetry breaking,
Sourov Roy, published in the Proceedings of the IX International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY’01), World Scientific (Eds. D.I. Kazakov and A.V. Gladyshev), pages 221-223.
12. Some aspects of R-parity violating supersymmetry,
Sourov Roy, in Proceedings of the Sixth Workshop on High Energy Physics Phenomenology (WHEPP-6), *Pramana - J. Phys.* **55**, 271 (2000).

13. The SUSY working group : summary report,
ESF Network Workshop and Winter School : Les Houches, 1999
hep-ph/0005142.

LIST OF TALKS DELIVERED IN SYMPOSIA/CONFERENCES/ MEETINGS

1. Some aspects of SUSY, invited talk at the Instructional Workshop Sangam@HRI, HRI, Allahabad, March 06, 2018
2. Gauged $U(1)_{L_\mu-L_\tau}$ and SUSY, invited talk at the NuHoRIzons VII, HRI, Allahabad, February 22, 2018
3. $U(1)_{L_\mu-L_\tau}$ gauge extension of SM and SUSY, invited talk at the workshop entitled Blueprints Beyond the Standard Model, TIFR, Mumbai, January 07, 2018
4. Supersymmetry with R-symmetry: neutrinos, Higgs boson and dark matter, invited talk at PAMRM 2017, ISI, Kolkata, March 15, 2017.
5. Stability constraints in triplet extension of the MSSM, Free Meson Seminar, TIFR, Mumbai, November 05, 2015.
6. Supersymmetry with R-symmetry: neutrinos, Higgs boson and dark matter, Invited Colloquium at the Department of Theoretical Physics, TIFR, Mumbai, November 13, 2015.
7. 7 keV sterile neutrino dark matter in $U(1)_R$ -lepton number model, invited talk at Advances in Astroparticle Physics and Cosmology (AAPCOS) at SINP, Kolkata, October 12-17, 2015.
8. An introduction to high energy physics - Higgs boson, neutrinos and dark matter, invited talk at Lady Keane College, Shilong, September 11, 12, 2015.
9. Photon-axion mixing, invited review talk at “Sangam@HRI: Instructional Workshop in Particle Physics”, March 29, 2013, HRI, Allahabad, India.
10. SUSY Inverse Seesaw and its signatures at the LHC, invited talk at “HIGGSTOP-2013”, February 26, 2013, BITS-Pilani, Goa.
11. SUSY Inverse Seesaw and its implications at the LHC, invited talk at “2nd KIAS Phenomenology Workshop”, September 11, 2012, Korea Institute for Advanced Study (KIAS), Seoul, Korea.
12. Supersymmetry, neutrino mass and the LHC, Special Universe Lecture at The Excellence Cluster “Origin and Structure of the Universe”, Munich, Germany, June 27, 2012.

13. Constraints on composite Dirac neutrinos from observations of galaxy clusters, invited talk at the Department of Physics, Technical University in Munich, Germany, June 20, 2012.
14. Exploring novel correlations at the LHC for the SUSY Inverse Seesaw model, invited talk at the Department of Physics, Technical University in Munich, Germany, June 16, 2012.
15. Resonant leptogenesis with non-holomorphic R-parity violation, invited talk at the meeting on ‘Leptogenesis and GUT’, November 23-25, 2011, Department of Physics, University of Calcutta.
16. Constraints on composite Dirac neutrinos from observations of galaxy clusters, invited talk at the Department of Physics, Helsinki University and the Helsinki Institute of Physics, September 23, 2011.
17. Supersymmetric Models: Spectra and Predictions, talk at the ‘Discussion Meeting on Physics at Early Run of the LHC’, March 22-23, 2011, IACS, Kolkata.
18. Light gravitinos at the LHC and implications for cosmology, invited talk at the International Workshop on ‘Dark Matter in LHC Era: Direct and Indirect Searches’, January 4-8, 2011, SINP, Kolkata
19. Particle Physics and the Standard Model, gave a twelve lecture course at the ‘Preparatory SERC School in Theoretical High Energy Physics’, October 20 - November 15, 2010, BITS-Pilani, K.K. Birla Goa Campus.
20. Signatures of sneutrino-antisneutrino oscillation at the LHC, invited talk at the Conference ‘Getting Ready for Physics at the LHC’, February 16-20, 2009, HRI, Allahabad.
21. Neutrino masses and mixing in a TeV scale SUSY seesaw model, invited talk at “Neutrinos in Physics, Astrophysics and Cosmology (NuHoRIzons 09)”, January 07, 2009 at HRI, Allahabad.
22. Photon axion mixing in a Randall-Sundrum model, invited talk at the ‘Workshop on the LHC and related physics’, October 4, 2008 at HRI, Allahabad.
23. Supersymmetry and neutrino masses, invited talk at the ‘Workshop on the LHC and related physics’, October 3, 2008 at HRI, Allahabad.
24. Photon-axion mixing in a Randall-Sundrum model, invited talk at “Nordita Programme: TeV scale physics and dark matter”, July 28, 2008 at the Nordic Institute of Theoretical Physics (NORDITA), Stockholm, Sweden.

25. Neutrino masses and mixing in a TeV scale SUSY seesaw model, invited talk at “Nordita Programme: TeV scale physics and dark matter”, July 22, 2008 at the Nordic Institute of Theoretical Physics (NORDITA), Stockholm, Sweden.
26. Split supersymmetry and the infrared fixed point of the top Yukawa coupling, talk at the 13th International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY2005), (July 18-23, 2005) at IPPP, Durham.
27. Higher dimensional models of light Majorana neutrinos confronted by data, talk at the Particle Physics Day, October 29, 2004 in Helsinki, Finland.
28. Effective R-parity violation from supersymmetry breaking, talk at the 12th International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY2004), (June 17-23, 2004) at Tsukuba, Japan.
29. Single sneutrino production at hadron colliders, talk at the Particle Physics Day, December 15, 2003 in Helsinki, Finland.
30. Single sneutrino production at hadron colliders, talk at the 8th Nordic LHC Physics Workshop, (November 28 - 29, 2003) at Lund, Sweden.
31. Linear Collider signals of Anomaly Mediated SUSY Breaking, Invited talk at the SLAC LCD Meeting, September 19, 2002.
32. Vacuum Stability Bounds in Anomaly and Gaugino Mediated SUSY Breaking Models, invited talk at the 47th Meeting of the Israel Physical Society (IPS2001), (December 17, 2001), Tel Aviv, Israel.
33. Linear Collider Signals of Anomaly Mediated Supersymmetry Breaking, talk at the 9th International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY'01) (June 11 -17, 2001) at Dubna, Russia.
34. Signals of Anomaly Mediated Supersymmetry Breaking in a Linear Collider, presented at XIV DAE HEP Symposium, University of Hyderabad, Hyderabad, India, December 18 - 22, 2000.
35. The Role of Bilinear R-parity violating interactions in Neutrino Phenomenology, invited talk at the Workshop on Neutrino Physics (August 9 - 11, 2000) at SINP, Calcutta, India.
36. Some Aspects of R-parity Violating SUSY, invited talk at the Sixth Workshop on High Energy Physics Phenomenology (WHEPP-VI) (January 3 - 15, 2000) at IMSc, Chennai, India.

37. Correlation between neutrino oscillations and signals of supersymmetry in an R-parity violating model,
presented at XIII DAE HEP Symposium, Panjab University, Chandigarh, India, December 26 - 30, 1998.
38. Bilinear Terms in R-parity violating SUSY,
talk given in the seminar session of the working group on Collider Physics at the Fifth Workshop on High Energy Physics Phenomenology (WHEPP-V) (January 12 - 26, 1998) at IUCAA, Pune, India.
39. Some implications of a supersymmetric model with R-parity breaking bilinear interactions,
presented at the ICTP-BCSPIN Kathmandu Summer School on 'Current Trends in High Energy Physics and Cosmology' (May 19 - June 3, 1997) at Kathmandu, Nepal.
40. Some implications of R-parity breaking bilinear interactions,
presented at XII DAE HEP Symposium, Gauhati University, Guwahati, India, December 26, 1996 - January 1, 1997

RESEARCH RÉSUMÉ

Phenomenology of Supersymmetric Theories

- **Phenomenology of light sneutrino dark matter**

We have studied the possibility of a light Dark Matter (DM) within a constrained Minimal Supersymmetric Standard Model (cMSSM) framework augmented by a SM singlet-pair sector to account for the non-zero neutrino masses by inverse seesaw mechanism. We have found that, we can have a light sneutrino DM with mass below 100 GeV satisfying all the current experimental constraints from cosmology, collider as well as low-energy experiments. We also note that the supersymmetric inverse seesaw mechanism with sneutrino as the lightest supersymmetric partner can have enhanced same-sign dilepton final states with large missing transverse energy (mET) coming from the gluino- and squark-pair as well as the squark-gluino associated productions and their cascade decay through charginos. We present a collider study for the same-sign dilepton+jets+mET signal in this scenario and propose some distinctions with the usual cMSSM. **(with P.S. Bhupal Dev, S. Mondal and B. Mukhopadhyaya and published in JHEP).**

- **Minimal supersymmetric inverse seesaw model and the trilepton signals at the LHC**

We have investigated signatures of the minimal supersymmetric inverse seesaw model at the large hadron collider (LHC) with three isolated leptons and large missing energy ($3\ell + \cancel{E}_T$ or $2\ell + 1\tau + \cancel{E}_T$, with $\ell = e, \mu$) in the final state. We have shown that even after considering possible leading standard model backgrounds these final states can lead to reasonable signal significance at the LHC with both 7 TeV and 14 TeV center-of-mass energy. **(with S. Mondal, S. Biswas and P. Ghosh and published in JHEP).**

- **Constraints on Axino warm dark matter from X-ray observations**

A sufficiently long lived warm dark matter could be a source of X-rays observed by satellite based X-ray telescopes. We have considered axinos and gravitinos with masses between 1 keV and 100 keV in supersymmetric models with small R-parity violation. We have shown that axino dark matter receives significant constraints from X-ray observations of Chandra and SPI, especially for the lower end of the allowed range of the axino decay constant f_a , while the gravitino dark matter remains unconstrained. **(with P. Dey, B. Mukhopadhyaya, S. Roy and S.K. Vempati and published in JCAP).**

- **Supersymmetry and Neutrino masses**

The origin of neutrino masses and mixing could be intrinsically supersymmetric. This is the case in models with R-parity violation, in which lepton number is broken ($\Delta L = 1$) together with the so-called R-parity. Breaking of R-parity may happen spontaneously, driven by a non-zero vacuum expectation value (vev) of a SM singlet neutrino, or by adding explicit R-parity breaking terms in the superpotential and the scalar potential. Adding three bilinear R-parity violating terms $\epsilon_i L_i H_2$ in the superpotential and three corresponding terms in the scalar potential provides the minimal way to break R-parity and generate neutrino masses

in the minimal supersymmetric standard model (MSSM). In this case, one neutrino mass scale (typically the atmospheric) is generated at tree level by neutralino mediated weak scale seesaw (closely analogous to the hybrid Type-I + Type-III seesaw), and the other scale (typically the solar) generated by finite one-loop corrections

In addition, one can have R-parity violating supersymmetric models which can simultaneously solve the μ problem of MSSM. The Majorana masses for the gauge-singlet neutrinos as well as the usual μ -term for the Higgs superfields are generated at the electroweak scale through the vacuum expectation values of the singlet sneutrinos. R-parity violating models lead to the decays of the lightest supersymmetric particle (LSP). The decay branching ratios show certain correlations with the neutrino mixing angles, which can be tested at the LHC. Various phenomenological of such R-parity violating models have been discussed. **(several published papers with different collaborators)**

Models with warped extra dimension

• Muon ($g-2$) and neutrino masses in a warped extra dimensional model

In the Randall-Sundrum model, a bulk neutrino field in the 5-dimensional space-time can give rise to tiny Dirac masses to neutrinos. In such a scenario, we have computed the contribution of the bulk neutrino field to the anomalous magnetic moment $(g-2)_\mu$ of muon. We have also studied possible constraints on the model parameters by including contributions to $(g-2)_\mu$ from other sources such as bulk gravitons. **(with R.S. Hundi and S. SenGupta and published in Phys. Rev. D).**

Lepton Flavor Violation

• Four lepton flavor violating signals at the LHC

We have studied the production and detection at the LHC of flavor violating charged quadrileptons which are shown to have certain advantages over dileptons in searching for lepton flavor violation. A classification of all six-fermionic operators, in the chiral basis and contributing to such processes, is made and the corresponding cross section for each in 14 TeV pp collisions is computed under the hypothesis of single operator dominance. We further present the sensitivity reach of the new physics scale Λ in terms of the integrated luminosity. **(with D.K. Ghosh and P. Roy and published in JHEP).**

Non-standard neutrino interaction

• Non-standard interaction in neutrino oscillation and recent Daya Bay, T2K experiments

We have studied the possible constraints on non-standard interaction(NSIs) in a model independent way by considering the recent results from T2K and Daya Bay neutrino oscillations experiments. Using various possible presently allowed NSI values we reanalyze numerically

the $\theta_{13} - \delta$ allowed region given by recent T2K experimental data. We obtain model independent constraints on NSIs in the $\delta - \epsilon_{\alpha\beta}^m$ plane using the θ_{13} value as measured by Daya Bay, where δ is the CP violating phase. Depending on δ values significant constraints on NSIs can be obtained for both hierarchies of neutrino masses. **(with R. Adhikari, S. Chakraborty and A. Dasgupta and published in Phys. Rev. D).**

Future plan:

There is a very strong expectation in the high energy physics community that in the next few years, the entire area of high energy physics will be at the dawn of a new era through the discovery of the mechanism for electroweak symmetry-breaking and possibly several new particles and interactions at the LHC. It is also worth noting that at the LHC, even if one finds some significant excess in a particular final state over the SM prediction, it would be a complicated task for both theoretical and experimental high energy physicists to identify this excess as due to any particular new physics model, since several such models could lead to very similar kinds of signatures at the LHC. This is a very involved task and we will be engaged in some analysis in this direction, particularly we shall try to see if the results from neutrino physics can shed some light in that direction.

On the other hand, if lepton number is violated by odd units then the lightest neutralino as a dark matter candidate is disfavoured and the most promising candidates for dark matter is the gravitino. Thus the signature of lepton number violation by odd units at the LHC would point towards a gravitino dark matter. In addition, if one wants to solve the strong-CP problem by introducing an axion then the axion or its superpartner axino could also be the dark matter candidates. Hence, the discovery of an axion in laboratory based experiments might give us a new direction to think about the dark matter and its connection with SUSY.

Some of the questions which might be very interesting are, for example:

- How is lepton flavour violation seen at the LHC ?
- What are the signatures of gravitino or axino dark matter at the LHC ?
- What is the connection between neutrinos masses and mixing and signatures of supersymmetry in various seesaw models ?
- What is the effect of non-standard interactions in neutrino oscillation phenomenon ?
- What is the most effective way to look for photon-axion mixing in the laboratory as well as in astrophysical observations ?