Mainak Chakraborty

Curriculum Vitae

Department of Physics, Sukanta Mahavidyalaya
(Affiliated to the University of North Bengal),
Dhupguri-735210, Jalpaiguri, West Bengal
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Personal Information

Nationality	Indian
Date of birth	30.09.1986
Marital Status	Married
Sex	Male

Permanent Address

Vill	Sahebbagan
Po	Bandel Jn.
Dist	Hooghly, Pin 712123
State	West Bengal (India)

Present position

Assistant Professor, Department of Physics, Sukanta Mahavidyalaya (Affiliated to N.B.U.), Dhupguri, Jalpaiguri, W.B., India

Teaching Experience

2024(March)–Till date **Assistant Professor**
Department of Physics,
Sukanta Mahavidyalaya (Affiliated to N.B.U.),
Dhupguri, Jalpaiguri, W.B., India

Topics taught (Theory and Lab)
Mechanics(Sem-I),
Wave and Optics(Sem-II),
Classical Mechanics (Sem-IV),
Advanced Mathematical Physics (sem-V, Sem-VI),
Electronics (Sem-V, Sem-VI),
Programming in Python(Sem-I, Sem-III, Sem-V)

Research Interest

High energy physics phenomenology in general. Particularly interested in Neutrino physics phenomenology and matter-antimatter asymmetry of the Universe with focus on

•Models of neutrino masses and mixing using flavour symmetries and textures
•Models of neutrino masses and mixing inspired from Grand Unified theories (GUT)
•Different baryogenesis mechanisms in models of neutrino masses and mixing
•Explicit study of baryogenesis via leptogenesis with emphasis on analytical solution of Boltzmann equations in standard and non-standard cosmology

Research Experience

2020(Sept)–2023(March) **Research Associate (National Post Doctoral Fellow)**
School of Physical Sciences,
Indian Association for the Cultivation of Science,
2A and 2B Raja S.C. Mullick Road, Jadavpur, Kolkata-700032

Mentor: Prof. Sourov Roy

2019(Sept)–2020(Sept) **Research Associate (Post Doctoral Fellow)**
Dept. of Physics,
University of Calcutta,
92, A.P.C. Road, Kolkata-700009

Mentor: Prof. Palash Baran Pal, Prof. Anirban Kundu

2016(Aug)–2019(Sept) **Post Doctoral Fellow**
Center of Excellence in Theoretical and Mathematical science (CETMS),
Siksha 'O' Anusandhan University,
Khandagiri, Bhubaneswar 751030, Odisha, India

Mentor: Prof. Mina Ketan Parida

2016(Feb)–2016(July) **Research Associate**
Astroparticle Physics and Cosmology Division,
Saha Institute of Nuclear Physics,
1/AF Bidhannagar, Kolkata-700064, India

2010(Aug)–2015(Dec) **Ph.D.**, *(degree awarded on June 10, 2016)*
Ph.D. registration under University of Calcutta
Registration no: 5681 Ph.D.(Sc.)Proceed/ 13, Date: 18/09/2013
Research work done at Saha Institute of Nuclear Physics, Kolkata, India.

Thesis Title– *A Study On Neutrino Masses, Mixing And Baryogenesis Through Leptogenesis In Some Electroweak Models.*

Thesis Supervisor – Prof. Ambar Ghosal,
Professor, Theory Division (formerly in Astroparticle Physics and Cosmology Division),
Saha Institute of Nuclear Physics,
1/AF Bidhannagar, Kolkata-700064, India
phone: +91 33 2337 5345 (-49) (5 Lines), Extn: 3326
email: ambar.ghosal@saha.ac.in, ambar.ghosal@gmail.com

Education

2023–till date **Diploma in Data Science**, *(Registered in the course in May 2023 and currently in its last term, the course is expected to be completed around the end of 2026)*
IIT Madras, Chennai, India
Subjects: Mathematics, Statistics, Machine learning foundations, Machine learning techniques, Machine learning practice, Tools in data science, Business data Management(BDM), Business Analytics, Project on BDM, Project on ML

2009–2010 **Post-M.Sc. (Physics) Associateship Course**, (One year Pre-Ph.D. mandatory course work)
Saha Institute of Nuclear Physics, Kolkata, India
Final marks/Grade: 70.72%
Advanced papers–Quantum Field Theory, High Energy Astrophysics, Neutrino Physics, General Relativity.
Review work topic–*Dark Energy and mass varying neutrinos.*
Review Supervisor–*Professor Ambar Ghosal*, SINP, Kolkata, India.

2007–2009 **M.Sc. in Physics**
University of Calcutta, Kolkata, India
Final marks/Grade: A+, *First Class*, 76.9%
Advanced papers–Quantum Field Theory, Particle Physics, Astrophysics.
Project Title– *Compactified dimensions and Newton's law in the millimeter range.*
Project Supervisor–*Professor Anirban Kundu*, University of Calcutta, Kolkata, India.

2004–2007 **B.Sc. Physics (Honours)**, Chemistry (Pass), Mathematics (Pass)
Serampore college, (University of Calcutta, Kolkata, India)
Final marks/Grade: *First Class*, 71.25% (honours marks)

2002–2004 **Higher Secondary (10+2)**
Subjects: Physics, Chemistry, Mathematics, Biology (additional), Bengali, English.
Hooghly Branch (govt.) School,(West Bengal Council of Higher Secondary Education)
Final marks/Grade: *First Division*, 80.3%

2000–2002 **Madhyamik/Secondary (10)**
Hooghly Branch (govt.) School, (West Bengal Board of Secondary Education).
Final marks/Grade: *First Division*, 88%

Awards and/ Fellowships

2019 **National Post-Doctoral Fellowship (NPDF)**, *awarded by SERB-DST. Govt. of India (Indian Association for the Cultivation of Science)*

2019 **Research Associateship**, *awarded by SERB-DST. Govt. of India (University of Calcutta)*

2019 **Institute Post Doctoral Fellowship (IPDF)**, *awarded by Indian Institute of Technology, Guwahati*

2016 **Post Doctoral Fellowship**, *awarded by Siksha O Anusandhan (Deemed to be University)*

2016 **Research Associateship (Bridging)**, *awarded by D.A.E. Govt. of India (Saha Institute of Nuclear Physics)*

2009 **Junior Research Fellowship (J.R.F) (and S.R.F w.e.f 2011)**, *awarded by D.A.E. Govt. of India (Saha Institute of Nuclear Physics)*

Participation in the Conferences

2020 Dec 14–28 , *XXIV DAE-BRNS Symposium on High Energy Physics, National Institute of Science Education and Research, Jatni, Odisha, India*
Title of talk presented: *Baryogenesis through leptogenesis in a S_4 flavon model with TM1 mixing for neutrinos*

2016 October 17–21 , *Probing the Frontiers of Particle Physics with Neutrinos and LHC held at Institute of Physics (I.O.P.), Bhubaneswar, India*

2015 October 12–17 , *Advances in Astroparticle Physics and Cosmology 2015 (AAPCOS 2015) held at Saha Institute of Nuclear Physics, Kolkata, India*

2013 June 14–17 , *Advances in Astroparticle Physics and Cosmology 2013 (AAPCOS 2013) held at Shimla, India*
Title of talk presented: *Masses, mixing angles and phases of general Majorana neutrino mass matrix: application to cyclic symmetric mass matrix*

2013 March 25–30 , *Sangam @ HRI: Instructional Workshop in Particle Physics held at HRI, Allahabad, India*

2013 Jan 13–18 , *XX DAE-BRNS High Energy Physics Symposium held at Visva-Bharati, Santiniketan, India*
Title of talk presented: *Scaling Ansatz, Four Zero Yukawa Textures and Neutrino Phenomenology*

2012 March 7–12 , *Advances in Astroparticle physics and Cosmology 2012 (AAPCOS 2012) held at Darjeeling, India*
Title of talk presented: *Scaling Ansatz, Four Zero Yukawa Textures and Neutrino Phenomenology*

2012 Feb 1–3 , *Nu Horizons V held at HRI, Allahabad, India*

2011 Nov 23–25 , *Conference on Leptogenesis & Gut held at University of Calcutta, Kolkata, India*

2011 January , *International Workshop on Dark Matter in the LHC era:Direct and Indirect Search held at SINP, Kolkata, India*

PG Dissertation Guided

Guided (unofficially) a final year PG student (Ms. Sohini Pal of BS-MS batch 2018, Indian Association for the Cultivation of Science, Deemed to be University, Kolkata) in her Masters project. Recently she got selected in the Ph.D. program of Oklahoma State University and University of Cincinnati in USA.

Computer skills

Operating Systems	Fedora, Ubuntu, Microsoft Windows
Languages	FORTRAN, PYTHON (basic), C (basic)
Packages	Mathematica
Plotting Softwares	gnuplot, Veusz, Mathematica

Languages known

Read, Write and Speak	Bengali, English, Hindi

Publications *(Link of my publications)*

1. A. Biswas, **M. Chakraborty** and S. Khan, "Reviewing the prospect of fermion triplets as dark matter and source of baryon asymmetry in non-standard cosmology", JCAP **08**, 026 (2023) [arXiv:2303.13950 [hep-ph]].

2. **M. Chakraborty**, K. Rama and A. Ghosal, "Baryogenesis Through Leptogenesis in a S_4 Flavon Model with TM_1 Mixing for Neutrinos", Springer Proc. Phys. **277**, 583-587 (2022).

3. **M. Chakraborty** and S. Roy, "Baryon asymmetry and lower bound on right handed neutrino mass in fast expanding Universe: an analytical approach", JCAP **11**, 053 (2022 [arXiv:2208.04046 [hep-ph]].

4. M. K. Parida, **M. Chakraborty**, S. K. Nanda and R. Samantaray, "Purely triplet seesaw and leptogenesis within cosmological bound, dark matter, and vacuum stability", Nucl. Phys. B **960**, 115203 (2020) [arXiv:2005.12077 [hep-ph]].

5. **M. Chakraborty**, R. Krishnan and A. Ghosal, "Predictive S_4 flavon model with TM1 mixing and baryogenesis through leptogenesis", JHEP **09**, 025 (2020) [arXiv:2003.00506 [hep-ph]].

6. **M. Chakraborty**, M. K. Parida and B. Sahoo, "Triplet Leptogenesis, Type-II Seesaw Dominance, Intrinsic Dark Matter, Vacuum Stability and Proton Decay in Minimal SO(10) Breakings", JCAP **01**, 049 (2020) [arXiv:1906.05601 [hep-ph]].

7. B. Sahoo, **M. Chakraborty** and M. K. Parida, "Neutrino Mass, Coupling Unification, Verifiable Proton Decay, Vacuum Stability and WIMP Dark Matter in $SU(5)$", Adv. High Energy Phys. **2018**, 4078657 (2018) [arXiv:1804.01803 [hep-ph]].

8. R. Samanta and **M. Chakraborty**, "A study on a minimally broken residual TBM-Klein symmetry with its implications on flavoured leptogenesis and ultra high energy neutrino flux ratios", JCAP **02**, 003 (2019) [arXiv:1802.04751 [hep-ph]].

9. B. Sahoo, M. K. Parida and **M. Chakraborty**, "Matter Parity Violating Dark Matter Decay in Minimal SO(10), Unification, Vacuum Stability and Verifiable Proton Decay", Nucl. Phys. B **938**, 56-113 (2019) [arXiv:1707.01286 [hep-ph]].

10. R. Samanta and **M. Chakraborty**, "Modified TBM and role of a hidden Z_2", Springer Proc. Phys. **203**, 193-196 (2018) [arXiv:1703.09579 [hep-ph]].

11. R. Samanta, **M. Chakraborty**, P. Roy and A. Ghosal, "Baryon asymmetry via leptogenesis in a neutrino mass model with complex scaling", JCAP **1703**, no. 03, 025 (2017) [arXiv:1610.10081 [hep-ph]].

12. R. Samanta, **M. Chakraborty** and A. Ghosal, "Evaluation of the Majorana Phases of a General Majorana Neutrino Mass Matrix: Testability of hierarchical Flavour Models", Nucl. Phys. B **904**, 86 (2016) [arXiv:1502.06508 [hep-ph]].

13. **M. Chakraborty**, H. Z. Devi and A. Ghosal, "Scaling ansatz with texture zeros in linear seesaw", *Phys. Lett. B* **741**, 210 (2015) [arXiv:1410.3276 [hep-ph]].

14. B. Adhikary, **M. Chakraborty** and A. Ghosal, "Flavoured leptogenesis with quasi degenerate neutrinos in a broken cyclic symmetric model", Phys. Rev. D **93**, no. 11, 113001 (2016) [arXiv:1407.6173 [hep-ph]].

15. B. Adhikary, **M. Chakraborty** and A. Ghosal, "Masses, mixing angles and phases of general Majorana neutrino mass matrix", JHEP **1310**, 043 (2013) [Erratum-ibid. **1409**, 180 (2014)] [arXiv:1307.0988 [hep-ph]].

16. B. Adhikary, **M. Chakraborty** and A. Ghosal, "Scaling ansatz, four zero Yukawa textures and large θ_{13}", Phys. Rev. D **86**, 013015 (2012) [arXiv:1205.1355 [hep-ph]].