Curriculum Vitae

1 Personal Profile

- **Name**: Shreya Banerjee.
- **Place of Birth** : Tollygunge in Kolkata, West Bengal, India.
- **Date of Birth** : 3rd January, 1990.
- **Nationality** : Indian.
- **Marital Status** : Married.

2 Contact Information

- **Office Address:**
  Room No. 617B, Academic Complex, Department of Physics,
  IIT (ISM) Dhanbad, Jharkhand.
- **Residential Address:**
  Apartment 98, Block 7, Type IV Quarters, IIT (ISM) Dhanbad, Jharkhand.
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  3A/1 Graham Road,
  Tollygunge, P.O. Regent Park,
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3 Present Position

Assistant Professor (Grade I) in the Department of Physics, Indian Institute of Technology (Indian School of Mines) Dhanbad, Jharkhand.

4 Past Post Doctoral Position

Post Doctoral Research Fellow in the Quantum Gravity Group, Department of Theoretical Physics, Friedrich Alexander University (FAU), Erlangen, Germany from 1st October, 2020 to 30th September, 2023.
Advisor: Prof. Thomas Thiemann.
Post Doctoral Fellow in the Department of Astrophysics, Ben Gurion University of the Negev, Beer Sheva, Israel from 1st October, 2018 to 30th September, 2020.
Advisor: Prof. David Eichler.
Sadly Prof. David Eichler passed away in the year 2021.

5 Career Objective

To work and fulfil my objectives as a research scientist in a resourceful and innovative organization where my skills in research oriented domains can be exponentially explored.

6 Personal and Professional Skills

Good communication skills, Responsible and adaptable, to maintain a vision and an unique approach, never give up attitude to achieve perfection, able to work in a team.

I have research experience on topics starting from quantum gravity, cosmology to astrophysics, their interconnections. I have extensive knowledge of general relativity, quantum field theory, black holes, early and late time cosmology and gamma ray bursts. I am capable of solving hard core theoretical problems. I have also worked with the latest observational data like SWIFT, FERMI GBM, Type Ia Supernovae, BAO, Cosmic Chromometer, etc. I can write complicated programming codes in python, mathematica. I have worked extensively on model constraining using data fitting, chi square minimisation, CAMB/CLASS code, etc.

7 Educational Qualification

- Worked as post doctoral fellow at Friedrich Alexander University (FAU), Erlangen, Germany under the guidance of Thomas Thiemann from 2020-2023.
- Worked as post doctoral fellow at Ben Gurion University, Beer Sheva, Israel under the guidance of Prof. David Eichler from 2018-2020.
- Obtained Ph. D. from TIFR, Mumbai, India under the guidance of Prof. T. P. Singh on February 15th, 2019. Ph. D. thesis title *'Cosmic Acceleration:Problems and Solutions'*.
- M.Sc (Hons) (Master's Degree) in Physics (November, 2013) from IIT Delhi, India (CGPA-9.356) .
  Rank: First Class First.
- BSc in Physics Hons. (July, 2011) from Lady Brabourne College, Kolkata (First class, 77.5%, with distinction in subsidiary subjects- Mathematics and Computer Science).
- Higher Secondary Board Exam (May, 2008) from Kendriya Vidyalaya Ballygunge (CBSE Board), Kolkata, India (CGPA-9.125).
- Secondary Board Exam (June, 2006) from St.Pauls' Boarding and Day School (ICSE Board), Kolkata, India (CGPA-9.18).

8 Research Interests

Cosmology, General Relativity, Astrophysics, Quantum Gravity; Black Holes, Birth Of the Universe; Dark Matter, Dark Energy; Modified Quantum Theory, Quantum Cosmology. During Ph. D., I explored mainly early Universe through inflation and bouncing cosmology. Also worked on modifying gravity to explain dark energy, dark matter and astrophysical phenomena like gravitational waves from binary pulsars etc. Currently during my post doctoral course, I am also exploring the field of high energy astrophysics mainly dealing with high energy phenomena like Supernova, Gamma Ray Bursts and Fast Radio Bursts.

9 Teaching Experience

- I was a Teaching Assistant for the course on Astronomy and Astrophysics-II taught by Prof. A. Gopakumar and Prof. D. Narasimha as a part of graduate programme at TIFR, 2014.
- I was a teaching assistant for the course of general relativity course I and II taught by Prof. Thomas Thiemann at FAU, Germany from 2020-2021.
- I was a teaching assistant for the course of Loop Quantum Gravity taught by Prof. Kristina Giesel at FAU, Germany from 2021-2022 (winter term).
- I was a teaching assistant for the course of Quantum Field Theory taught by Prof. Kristina Giesel at FAU, Germany in the year 2022 (summer term).
- I am a teaching assistant for the course of Advanced Quantum Mechanics taught by Prof. Kristina Giesel at FAU, Germany in the year 2022-2023 (winter term).

During my last post doctoral position, I was the tutor for the following advanced physics courses- General Relativity 1, General Relativity 2, Canonical Quantum Gravity, Quantum Field Theory, Advanced Quantum Mechanics. 180min/week in front of the blackboard, 600min/week preparation. The duration of the courses taught are as follows: winter term 2020/21: Advanced General Relativity I ; summer term 2021: Advanced General Relativity II; winter term 2021/22: Canonical Quantum Gravity; summer term 2022: Quantum Field Theory; winter term 2022/2023: Advance Quantum Mechanics. Students at both UG, PG and Ph. D. Level took the courses. There were roughly 20-30 students for each course. I had taken detailed tutorial classes where I solved difficult high level problems and also taught the students on topics related to the courses. I also solved any queries related to lecture classes during the tutorials. I further conducted exams and analysed the performance of the students.

10 Schools and Conferences Attended

- Workshop on Cosmology and Large Scale Structure at Jamia Milia Delhi, 2015.
- 14th Marcel Grossmann Meeting, Rome from 12-18 July, 2015.
- Summer School on Cosmology, ICTP, Trieste, Italy, June, 6th -17th, 2016.
- Fundamental Problems of Quantum Physics, ICTS, Bangalore, India, 21st Nov-10th Dec, 2016.
- Cosmology-the next decade, ICTS, Bangalore, India, January, 22th-25th, 2019.
- The Origin of Fast Radio Bursts, Weizmann Institute, Israel, December, 3rd-13th, 2019.
- 22nd International Conference on General Relativity and Gravitation, Valencia, Spain, July, 7th-12th, 2019.
- Online Workshop on Quantum Gravity, Higher Derivatives and Non-Locality from 8-12 March, 2021.
- Online 16th Marcel Grossmann Conference from 5-12 July, 2021.
- Online 23rd International Conference on General Relativity and Gravitation from 3-8 July, 2022.
- Tensions in Cosmology, Corfu Summer Institute, Greece, from 7-12 September, 2022.

11 Academic Awards and Distinctions

- Selected among the top 25 students in National Graduate Physics Part C Examination in India, 2011.
- Acquired 2nd rank in Calcutta University, Kolkata, West Bengal during BSc. 2010-2011.
- Awarded Dr. Neeraj Srivastava Prize for securing highest cumulative grade points amongst the MSc. Students in IIT delhi during the session 2012-2013.
- Prof. Vidya Bhushan Anand Memorial award in MSc. Physics at IIT Delhi during session 2012-2013.
- Ratanbai Jerajani Award, for Best Seminar, Department of Astronomy and Astrophysics, Tata Institute of Fundamental Research Endowment Fund, 2015.
- Honourable mention in the Gravity Research Foundation Essay Contest 2015 for the essay 'Cosmological constant, quantum measurement, and the problem of time'; with Prof. Tejinder P. Singh and Sayantani Bera.
- Honourable mention in the Gravity Research Foundation Essay Contest 2016 for the essay 'Quantum Nonlocality, and the End of Classical Spacetime'; with Prof. Tejinder P. Singh and Sayantani Bera.
- Selected (did not avail) for the SERB Ramanujan Fellowship, 2024.
- Invited Referee for the journals: Physics Letters B, Sci Post, Journal of Astronomy and Astrophysics and Foundations in Physics, International Journal of Geometric Methods in Modern Physics.

12 Talks

- "**Testing models beyong ΛCDM**", invited plenary speaker talk at Cosmology from Home Conference (online), from 3-14 July, 2023.
- "**Constraining $F(R)$ bouncing cosmologies with primordial black holes**", invited talk in Prof. Gino Isidori's group at the University of Zurich, Switzerland on 16th December, 2022.
- "**Resolving Hubble Tension with New Gravitational Scalar Tensor Theories**", Tensions in Cosmology, Corfu Summer Institute, Greece, from 7-12 September, 2022.
- "**Luminosity Selection in Gamma Ray Bursts**", 23rd International Conference on General Relativity and Gravitation (online), 3-8 July, 2022.
- "**Primordial black hole formation in $F(R)$ bouncing cosmology**", invited talk to cosmology seminar of Prof. Luca Amendola's cosmology group at Heidelberg University, Germany on 5th July, 2022.
- "**Observational Constraints on Superfluid Dark Matter Models**", invited talk at Chung-Ang University, Seoul, Republic of Korea on 24th November, 2022, in the group of Prof. Hyun Min Lee.
- "**Growth of Linear Perturbations in a Universe with Superfluid Dark Matter**", 16th Marcel Grossmann Conference (online), July 5-12, 2021.
- "**Dynamics Of Inflation And Dark Energy From F(R,G) Gravity**", 22nd International Conference on General Relativity and Gravitation, Valencia, Spain, July, 7th-12th, 2019.
- "**Luminosity Selection In Gamma Ray Bursts**", 22nd International Conference on General Relativity and Gravitation, Valencia, Spain, July, 7th-12th, 2019.
- "**Bounce and Cyclic realization in Weakly Broken Galileon Theories**", Cosmology-the next decade, ICTS, Bangalore, India, January, 22th-25th, 2019.
- "**Why Inflationary perturbations become classical**", during my visit to Prof. Assem Paranjape, IUCAA, Pune, India, 2018.
- "**Why Inflationary perturbations become classical**", during my visit to Prof. Stefano Liberati, SISSA, trieste, 2017.
- "**Why Inflationary perturbations become classical**", during my visit to Prof. Atish Dabholkar and Paolo Creminelli, ICTP, trieste, 2017.
- "**Quantum discord as a tool for comparing collapse models and decoherence**", FPQP, ICTS Bangalore, 21st Nov. to 10th Dec., 2016.
- "**Cosmological Constant, Quantum Measurement and The Evolution Of Quantum Universe**", ICGC, IISER Mohali, Dec. 14-18, 2015.
- "**Classicalization of Inflationary Perturbations Using CSL**", ICGC, IISER Mohali, Dec. 14-18, 2015.
- "**Cosmic Hysteresis**", MG14, University Of Rome, July 12-18, 2015.
- "**Explaining Late-time Acceleration in a Model of Fourth Order Gravity**", MG14, University Of Rome, July 12-18, 2015.
- "**Evolution of Quantum Universe, Quantum Measurement and Cosmological Constant**", MG14, University Of Rome, July 12-18, 2015.
- "**Classicalization Of Inflationary Perturbations using Collapse Models**", MG14, University Of Rome, July 12-18, 2015.
- "**Application of CSL in Cosmology**", during my visit to Prof. Angelo Bassi, University of Trieste, 2015

13 Full List Of Publications/e-prints:

A. In Refereed Journals/arXiv:

1. *Primordial black holes and induced gravitational waves in non-singular matter bouncing cosmology*; Theodoros Papanikolaou, Shreya Banerjee, Yi-Fu Cai, Salvatore Capozziello, Emmanuel N. Saridakis, JCAP **06** (2024), 066.
2. *Quantum Imprints on CMBR*; Shreya Banerjee, Universe **9**, 9, 405, 2023.
3. *Alleviating H_0 Tension with New Gravitational Scalar Tensor Theories*; Shreya Banerjee, Maria Petronikolou, Emmanuel N. Saridakis, Phys. Rev. D **108**, 024012, 2023.
4. *Prospects of Probing Dark Matter Condensates with Gravitational Waves*; Shreya Banerjee, Sayantani Bera, David F. Mota, JCAP **03**, 041, 2023.
5. *Constraining $F(R)$ bouncing cosmologies with primordial black holes*; Shreya Banerjee, Theodoros Papanikolaou, Emmanuel N. Saridakis, Phys. Rev. D **106**, 124012, 2022.
6. *Luminosity Selection for Gamma Ray Burst*; Shreya Banerjee, Dafne Guetta, A&A, **661**, A145, 2022.
7. *Differential Source Count for Gamma Ray Bursts*; Shreya Banerjee, David Eichler, Dafne Guetta, ApJ, **921**, 79, 2021.
8. *Growth of Linear Perturbations in a Universe with Superfluid Dark Matter*; Shreya Banerjee, Sayantani Bera and David F. Mota, JCAP **07**, 034, 2020.
9. *Running Vacuum from Dynamical Spacetime Cosmology*; S. Banerjee, D. Benisty, E.I. Guendelman, Bulg. J. Phys. **48**, 117-137, 2021.
10. *Evading the theoretical no-go theorem for nonsingular bounces in Horndeski/Galileon cosmology*; Shreya Banerjee, Yi-Fu Cai and Emmanuel N. Saridakis, Class. Quant. Grav. **36**, 135009, 2019.
11. *Dynamics of inflation and dark energy from F(R, $\mathcal{G}$) gravity*; S. D. Odintsov, V. K. Oikonomou and S. Banerjee, Nucl. Phys. B **938**, 935-956, 2019.
12. *Bounce and cyclic cosmology in new gravitational scalar-tensor theories*; Emmanuel N. Saridakis, Shreya Banerjee and R. Myrzakulov, Phys. Rev. D **98**, 063513, 2018.
13. *Stability of charged particles inside a Paul trap with spontaneous localization dynamics*; Sayantani Bera and Shreya Banerjee, arXiv:1808.10766.
14. *Constraints on fourth order gravity from binary pulsars and gravitational waves*; Shreya Banerjee, Sayantani Bera, Srimanta Banerjee and T. P. Singh, Phys. Rev. D **96**, 084015 (2017).
15. *On signatures of spontaneous collapse dynamics modified single field inflation*; Shreya Banerjee, Suratna Das, K. Sravan Kumar, T. P. Singh, Phys. Rev. D **95**, 103518 (2017).
16. *Quantum discord as a tool for comparing collapse models and decoherence*; Shreya Banerjee, Sayantani Bera, Tejinder P. Singh, Phys.Lett. A **380** 3778-3785 (2016).
17. *Quantum Nonlocality, and the End of Classical Spacetime*; Shreya Banerjee, Sayantani Bera and Tejinder P. Singh, Int. J. Mod. Phys. D **25**, 1644005 (2016).
18. *Bounce and cyclic cosmology in weakly broken galileon theories*; Shreya Banerjee, Emmanuel N. Saridakis, Phys. Rev. D **95**, 063523 (2017).
19. *Hysteresis in the sky*, Sayantan Choudhury; Shreya Banerjee, Astroparticle Physics **80**, 34-89 (2016).
20. *Cosmological Constant, Quantum Measurement, and the Problem of Time*; Shreya Banerjee, Sayantani Bera, Tejinder P. Singh, Int. J. Mod. Phys.**24**, 1544011 (2015).
21. *Cosmic Acceleration in a Model of Fourth Order Gravity*; Shreya Banerjee, Nilesh Jayswal, Tejinder P. Singh, Phys. Rev. D**92**, 084026 (2015).

22. *Classicalization of inflationary perturbations by collapse models in the light of BICEP2*; Suratna Das, Satyabrata Sahu, Shreya Banerjee, T. P. Singh, Phys. Rev. D**90**, 043503 (2014).

B. Conference Proceedings:

1. *Classicalization Of Inflationary Perturbations using Collapse Models*; Suratna Das, Satyabrata Sahu, Shreya Banerjee, T. P. Singh, World Scientific, Proceedings of the Fourteenth Marcel Grossmann Meeting on General Relativity, Edited by R. Ruffini and G. Vereshchagin, pages 2759-2765, volume 3, 2017, book titled 'On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics, and Relativistic Field Theories'.

2. *Evolution of Quantum Universe, Quantum Measurement and Cosmological Constant*; Shreya Banerjee, Sayantani Bera and Tejinder P. Singh, World Scientific, Proceedings of the Fourteenth Marcel Grossmann Meeting on General Relativity, Edited by R. Ruffini and G. Vereshchagin, pages 2803-2808, volume 3, 2017, book titled 'On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics, and Relativistic Field Theories'.

3. *Explaining Late-time Acceleration in a Model of Fourth Order Gravity*; Shreya Banerjee, Nilesh Jayswal, T. P. Singh World Scientific, Proceedings of the Fourteenth Marcel Grossmann Meeting on General Relativity, Edited by R. Ruffini and G. Vereshchagin, pages 2204-2209, volume 3, 2017, book titled 'On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics, and Relativistic Field Theories'.

4. *Cosmic Hysteresis*; Sayantan Choudhury; Shreya Banerjee, World Scientific, Proceedings of the Fourteenth Marcel Grossmann Meeting on General Relativity, Edited by R. Ruffini and G. Vereshchagin, pages 1247-1252, volume 3, 2017, book titled 'On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics, and Relativistic Field Theories'.

5. *Growth of linear perturbations in a universe with superfluid dark matter*; S. Banerjee, S. Bera and D. F. Mota, World Scientific, Proceedings of the Sixteenth Marcel Grossmann Meeting on General Relativity, Edited by R. Ruffini and G. Vereshchagin, pages 2101-2118, volume 4, 2021, book titled 'On Recent Developments in Theoretical and Experimental General Relativity, Astrophysics, and Relativistic Field Theories'.

C. In arXiv:

1. *Analysing Hubble Tension and Gravitational Waves for $f(Q,T)$ Gravity Theories*; Shreya Banerjee, Aritrya Paul; arXiv:2408.14878.

2. *Effect of Accretion on the evolution of Primordial Black Holes in the context of Modified Gravity Theories*; Shreya Banerjee, Aritrya Paul; arXiv:2406.04605.

14 Ph. D./MSc. students

Int. MSc-Ph.D./Ph. D. students: Sanchari Biswas, Dibash K. Palita, Ajeet Singhal

MSc. students: Aritrya Paul, Rohit Kumar, Shivani Pandey

15 Suggestive References

- Prof. T. P. Singh,
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