

Curriculum Vitae – Rupal Basak

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ACADEMIC QUALIFICATION

- Postoc** N. COPERNICUS ASTRONOMICAL CENTER (NCAC), WARSAW October 2014 – Present
- Ph.D.** TATA INSTITUTE OF FUNDAMENTAL RESEARCH (TIFR) 2009 – Sep 2014
Advisor: Prof. A. R. Rao, TIFR
Thesis title: *Spectral and Timing Analysis of the Prompt Emission of Gamma Ray Bursts*
Justice Oak Best Thesis awarded by Astronomical Society of India
- M.Sc.** INDIAN INSTITUTE OF TECHNOLOGY (IIT), KANPUR 2007 – 2009
Topper in two out of four semesters
- B.Sc.** UNIVERSITY OF CALCUTTA 2004 – 2007
Topper of the college

RESEARCH FIELDS

- GAMMA RAY BURST (GRB): Radiation mechanism, Timing & spectral analysis, correlation
- X-RAY BINARY (XRB): Accretion disk, spectral studies, long-term monitoring
- HARD X-RAY INSTRUMENTS: Astrosat CZT Imager (CZTI), Charge Particle Monitor (CPM)
- OTHER RESEARCH INTERESTS: QPO, SN remnant, Gravitational wave counterpart

RESEARCH GRANTS

4. **PI in ‘START’ (2016–17):** 46,000 Polish zloty (fellowship & travel grant), Foundation for Polish Science. Young researchers among all academic disciplines in Poland (success rate 9.37%).
3. **PI in Young researcher grant (2016–17):** for individual project titled ‘Study of X-ray Binary and Gamma-ray Burst with Astrosat’ at Nicolaus Copernicus Astronomical Center (2016).
2. **PI in Young researcher grant (2015–16):** for individual project titled ‘Radiation process in a spine-sheath jet of gamma-ray burst’ at Nicolaus Copernicus Astronomical Center (2015).
1. **Co-I:** Inflows and outflows around black holes and neutron stars, PI: A. Zdziarski (2015).

INVITED TALKS

6. **Invited talk** titled “*Radiation mechanism and geometry of accretion disk in the hard state of black hole binary*” to be delivered in the international conference ‘*Wide Band Spectral and Timing Studies of Cosmic X-ray Sources*’, TIFR, India, Jan 10 – 13, 2017.
5. **Invited talk** titled “*Spectroscopy of GRBs: clues for the radiation mechanism and jet geometry*” in the international conference ‘*Jet Triggering Mechanisms in Black Hole Sources*’, TIFR, India, Jan 20 – 23, 2016.
4. **Invited talk** titled “*Pulse-wise GRB correlation: implication as a cosmological tool*” in the international conference ‘*Fourteenth Marcel Grossmann Meeting*’, Rome, July 12 – 18, 2015.
3. **Invited talk** titled “*The signature of the photosphere in the pulses of GRBs*” in the international conference ‘*Hard X-ray Astronomy: Astrosat and Beyond*’, Goa, India, September 24 – 26, 2014.
2. **Invited talk** titled “*Prompt Emission of GRBs*” at the *IISc Astrophysics seminar series*, Indian Institute of Science (IISc), Bangalore, India, April 2, 2013.

1. **Invited talk** titled “*Temporal and spectral study of Fermi GRBs using different models and their interpretations*” in the international conference ‘*X-ray View of Cosmos*’, Physical Research Laboratory (PRL), India, April 23 – 25, 2012.

AWARDS AND DISTINCTIONS

11. **Best Thesis:** Justice Oak best thesis, Astronomical Society of India (2016). Competition based on nomination of young Indian Astronomers who defended their thesis one year prior to the call.
10. **Postdoctoral fellowship:** independent research at NCAC (2014–2017).
9. **NET JRF:** Junior Research Fellowship in National Eligibility Test (2010).
8. **Graduate fellowship:** at Tata Institute of Fundamental Research (2009–14).
7. **VSP fellowship:** Visiting Student Program at Harish Chandra Research Institute (2008).
6. **Institute merit scholarship:** for academic excellence during Master’s study (2007–09).
5. **JBNSTS Jagadish Bose National Science Talent Search** fellowship in recognition as a creative student of basic science, among all students of science disciplines of the state (2004–2007).
4. **NGPE 2007:** National top 1% in National Graduate Physics Examination (2007).
3. **Ramgopal-Bimala Agarwala Medal:** Topper in college (Physics), Calcutta University (2007).
2. **Saraju Bala prize:** highest total marks in all the college exams in Physics Dept (2007).
1. **NIUS:** Selected for National Initiative on Undergraduate Science at HBCSE (2005).

SCIENTIFIC COLLABORATIONS

1. **Astrosat team:** Associated with the multi-wavelength mission, *Astrosat* which was successfully launched on Sep 28, 2015. Developed codes to analyze the laboratory data of CZT Imager (CZTI). Performed laboratory testing and characterization of Charge Particle Monitor (CPM). Currently, involved in data analysis of GRBs (lead role) and XRBs detected by the mission.
2. **Integral team:** Collaboration at Integral Science Data Center (ISDC), Switzerland (contact: Dr. E. Bozzo) for analysis of recently detected low mass X-ray binaries and classification of one new source. Another long term project concerns analysis of 13 years of *Integral* data of all neutron star binaries. This study will enable us to find novel signature of different states and better understanding of these sources.
3. **Theseus:** ‘Transient High Energy Sky and Early Universe Surveyor’ is a planned GRB mission (ESA M5 call), specialized to detect high redshift GRBs. I joined the consortium (contributory scientist) based on an invitation from the PI, Dr. Lorenzo Amati (INAF, Bologna) in 2016.

RESEARCH VISITS, TALKS AND POSTERS

14. **Long term visit** at ISDC, Switzerland for works related to *Integral*, May 27 – July 29, 2016.
13. Poster “*Thermal emission from the photosphere of GRB jet*”, 9th Harvard-Smithsonian Conference on Theoretical Astrophysics named ‘*The Transient Sky*’, USA, May 16 – 19, 2016.
12. Poster titled “*Spectral analysis of the XMM-Newton data of GX 339-4 in the low/hard state during the outburst of 2013: Disk truncation radius and other issues*” in the international conference ‘*The Extremes of Black Hole Accretion*’, ESAC, Madrid, Spain, June 8 – 10, 2015.
11. Group project, ‘*Cloudy workshop*’, Warsaw, May 4 – 8, 2015. **Submitted paper in MNRAS.**
10. Poster “*Nature of thermal emission from the photosphere of GRB jet*” in ‘*Relativistic Jets: Creation, Dynamics, and Internal Physics*’, Krakow, Poland, April 20 – 24, 2015.

9. **Talk** titled “*The prompt emission of gamma-ray bursts: signature of the thermal component*” in 33rd Meeting of the Astronomical Society of India (ASI), Pune, India, February 17 – 20, 2015.
8. **Talk** titled “*Revisiting Photospheric Model of GRB Prompt Emission*” and two posters titled “*Study of the Prompt Emission of GRBs With and Without Supernova*” and “*Time Resolved Spectral Analysis of Bright Fermi/LAT Detected GRBs*” in YIPQS **long-term international workshop** ‘*Supernovae and Gamma-Ray Bursts*’, YITP, Kyoto, Japan, 28 Oct – 15 Nov, 2013.
7. Poster titled “*GRB as luminosity indicator*” in the international IAU Symposium 296: ‘*Supernova environmental impacts*’, Raichak, India, Jan 7 – 11, 2013.
6. **Talk** titled “*Spectral Evolution in GRB Pulses*” in the international ‘*Young Astrophysicists Symposium*’, Mumbai, Dec 19 – 21, 2012.
5. **Talk** in ‘*Winter School on Astronomical and Cosmological Surveys*’, Mumbai, Dec 10 – 17, 2012.
4. **Talk** titled “*A New Pulse-wise Correlation of GRB Prompt Emission: A Possible Cosmological Probe*” in ‘*39th COSPAR Scientific Assembly*’, Mysore, India, June 14 – 22, 2012.
3. **Talk** titled “*Pulse Spectral Evolution of GRBs: Implication as Standard Candle*” in the international ‘*Fermi / Swift GRB Conference 2012*’, Munich, Germany, May 7 – 11, 2012.
2. **Talk** titled “*Temperature evolution of GRB pulses: reviewing Band model*” in the international workshop ‘*Advanced Workshop on X-ray Timing*’, IUCAA, Pune, January 23 – 28, 2012.
1. Attended *International Conference on Gravitation and Cosmology*, Goa, Dec 14 – 19, 2011.

MENTORING STUDENTS

1. Mentoring a **PhD student** under Prof. A. R. Rao on various projects related to GRBs through Skype meeting and occasional visits (since 2015). **1 published paper, 2 in preparation.**
2. Mentored undergraduate students under the NIUS program for the analysis of GRBs detected by the *Fermi* (2012 – 2013). **1 published paper.**
3. Mentored Master’s students under Visiting Students’ Research Programme (VSRP) at TIFR in testing of the CZTI instrument of ASTROSAT (May – July, 2013).
4. Helped research students from various institutes for laboratory testing of CZTI during 2013 – 2014.

SCIENCE POPULARIZATION ACTIVITIES

1. **NCAC Highlighted research:** The paper ‘*Thermal Emissions Spanning the Prompt and the After-glow Phases of the Ultra-long GRB 130925A*’ by Basak & Rao (2015, ApJ) was selected for the highlighted research by the public outreach at NCAC, July 2015.
2. **Journal Club:** Arranged journal clubs at TIFR and at NCAC (twice each).
3. **TIFR FoS:** Frontiers of Science at TIFR (3 times during 2012–14). Volunteered for Astrophysics laboratory. Explained ASTROSAT to school students.

SKILLS

1. **Gamma-ray Astronomy:** Data analysis of *Fermi* Large Area Telescope (LAT).
2. **X-ray Astronomy:** X-ray data analysis of *Swift* Burst Alert Telescope (BAT), X-ray Telescope (XRT), *Fermi* Gamma-ray Burst Monitor (GBM), *Chandra* Advanced CCD Imaging Spectrometer (ACIS), *NuSTAR*, *XMM-Newton*, *RXTE* Proportional Counter Array (PCA), High Energy X-ray Timing Experiment (HEXTE), *Suzaku*, *Integral* Imager on-Board the INTEGRAL Satellite (IBIS), Jem-X. Spectral, timing and imaging analysis. Spectral software XSPEC, imaging software DS9 and timing software GHATS developed by Prof. T. Belloni of INAF, Italy.

3. **Optical and Radio Astronomy:** Moderate experience with Optical and Radio data analysis. Photometric analysis with IRAF and Radio data analysis with AIPS.
4. **Computer Skills:** FORTRAN, IDL, PYTHON, MATLAB, MATHEMATICA. GRB software RMFIT, CIAO for *Chandra*, XMMSAS for *XMM-Newton* etc. Developed semi-automatic codes for the analysis of the GRB data based on IDL, XSPEC script, local and table model. Softwares developed for the analysis of the laboratory data of CZTI and CPM detector of *ASTROSAT*.