Dimple

Post Doctoral Fellow (PDF)
CMI, Chennai; India 603103.
(+91) 999 692 4816 | dimplepanchal96@gmail.com

Research Interests

High energy Astrophysics • Gamma Ray Bursts (GRBs) • Short GRBs • Afterglows • Kilonovae • Machine Learning • Gravitational Waves (GWs)

Experience

Post Doctoral Fellow (PDF) — *Chennai, India*
Chennai Mathematical Institute (CMI) — *November 2023 - Present*

Senior Research Fellow (SRF) — *Nainital, India*
Aryabhatta Research Institute of Observational sciences (ARIES) — *July 2020 - November 2023*

Junior Research Fellow (JRF) — *Nainital, India*
Aryabhatta Research Institute of Observational sciences (ARIES) — *July 2018 - July 2020*

Education

PhD, Astronomy and Astrophysics — *Gorakhpur, India*
Deen Dayal Upadhyaya Gorakhpur University (DDUGU) — *Submitted: 27 Sept 2023, Defended: 6 Feb 2024*

- Title of thesis: Multi-wavelength studies of gamma-ray bursts (GRBs) and their associated counterparts
- Supervisor: Dr. Kuntal Misra

Master of Science (M.Sc.), Physics — *Kurukshetra, India*
Kurukshetra University Kurukshetra — *2016-2018*

- Subjects: Physics
- Percentage: 76.14 %

Bachelor of Science (B.Sc.) — *Kurukshetra, India*
Kurukshetra University Kurukshetra — *2013-2016*

- Subjects: Physics, Chemistry, Maths
- Percentage: 82.40 %

Awards/Fellowships

- **2023**: Financial support to attend a conference in Belgium at KU, Leuven, under the International Travel Support (ITS) scheme from the Department of Science and Technology, Government of India.
- **2020- 2023**: Senior Research Fellowship (SRF) from the Department of Science and Technology, Government of India.

- **2018-2020**: Junior Research Fellowship (JRF) from the Department of Science and Technology, Government of India.
- **2017**: Qualified National Eligibility Test (NET): Physics. This exam is conducted for eligibility to join as an assistant professor in Indian Universities.
- **2016**: Qualified Joint Admission Test (JAM): Physics. This exam is conducted for admission to M.Sc. in various research institutes in India.
- **2009**: Got an award for outstanding performance in the middle examination from the Board of school education, Haryana, India. This award also includes financial support for higher studies.

Technical and computational skills

Instrumentation

- Characterized the 4k x 4k CCD Camera of ADFOSC, which is one of the main instruments of 3.6m DOT.

Observational Experience

- Conducted observations at Devasthal Observatory using the 1.3m DFOT and 3.6m DOT telescopes over approximately 75 nights.
- Conducted observations at Nainital Observatory using the 1m ST telescope for about 40 nights.

Data Handled

- **High-energy Data**
  Fermi - GBM/LAT ; Softwares used: *RMfit, Fermisciencetools, Fermi GBM Data Tools, threeML*
  Swift - BAT/XRT ; Softwares used: *Heasoft, XSpec, threeML*;
- **Optical Data**
  1.4m Sampoorananand Telescope, ARIES, India • 1.3m Devasthal Fast Optical Telescope, ARIES, India; 3.6m Devasthal Optical Telescope, ARIES, India • 2.0m Himalayan Chandra Telescope, Hanle, India • 1.0m Zeiss telescope, Russia • 2.2m CAHA, Almeria, Spain • 2.0 m Liverpool telescope, La Palma, Canary Islands, Spain • 0.8m OAJ wide field survey telescope, Spain • 1.5m AZT-20 telescope, Almaty,Kazakhstan • 2.6m CrAO Shajn telescope, Ukraine.

- **Computational Skills**
  Programming Language: *Python*;
  Softwares used: *Astropy, Photutils, IRAF, DAOPHOT, Emcee, Pymultinest, Prospector, Afterglowpy, SKlearn, UMAP, tSNE, AutoGMM, giotto-tda*

Telescope Time Awarded

- 3.6m Devasthal Optical Telescope (DOT). Role: PI; Proposal title: **Probing short Gamma Ray Burst progenitors using optical/NIR counterparts** ; Proposal Type: Long-term Program; cycle: 2020-C2, 2021-C1, 2021-C2, 2022-C1, 2022-C2, 2023-C1, 2023-C2;
  Total time Awarded: $\sim$ *50 Hours.*

- 3.6m Devasthal Optical Telescope (DOT). Role: PI; Proposal title: **Revealing the true energetics of highly energetic LAT detected GRBs using 3.6m DOT** ; Proposal Type: Long-term Program; cycle: 2021-C2, 2022-C1, 2022-C2, 2023-C1;
  Total time Awarded: 26 Hours.
- 3.6m Devasthal Optical Telescope (DOT). Role: Co-PI; Proposal title: **DOT follow-up observations of AstroSat CZTI detected GRBs** ; Proposal Type: Long-term Program; cycle: 2020-C2, 2021-C1, 2021-C2, 2022-C1, 2022-C2, 2023-C1;
  Total time Awarded: 43 Hours.
- 2.0m Himalayan Chandra Telescope (HCT). Role: Co-PI; Proposal title: **in search of GRB optical afterglows and relativistic candidates**
  Total time Awarded: 35 Hours.
- 3.6m Devasthal Optical Telescope (DOT). Role: Co-PI; Proposal title: **DOT follow-up observations of AstroSat CZTI detected GRBs** ; Proposal Type: Long-term Program; cycle: 2020-C2, 2021-C1, 2021-C2, 2022-C1, 2022-C2, 2023-C1;
  Total time Awarded: 43 Hours.
- 1.3m Devasthal Fast Optical telescope (DFOT). **Optical follow-up observation of GRB afterglows**, Long term observational program from 2019-2022 as PI;
  Total time awarded: 48 full nights.
- 1.3m Devasthal Fast Optical telescope (DFOT). **Target of Opportunity Observations of Optical Counterparts of Gravitational Wave Sources** , Long term observational program from 2022-2023 as PI;
  Total time awarded: 8 full nights.
- 1.04m Sampoornanand telescope (ST). **Follow-up observations of optical afterglows of GRBs**, Long term observational program from 2019-2023 as PI;
  Total time awarded: 32 full nights.

Conferences/Schools/Workshops

Conferences

- **2024** Presented an *invited talk* titled: **Role of machine learning in Astronomy and Astrophysics** at the conference titled: National Conference on Artificial Intelligence in Astronomy and Astrophysics (20th January 2024) at University of Calicut, India.
- **2024** Presented a *talk* titled: **Classification of Gamma-Ray Burst Progenitors Using Machine Learning** at the conference titled: 9th Regional Astronomy Meeting (RAM) 2024 - Manipal, India (10-12 January 2024). [link]
- **2023** Presented a *talk* titled: **Insights into the emission mechanisms of VHE GRBs** at the conference titled: Advances In Relativistic Astrophysics - 2023 held at ARIES, India (02-04 November 2023). [link]
- **2023** Presented a *talk* titled: **Evidence for Two distinct populations of kilonova-associated Gamma-Ray Bursts** at the conference titled: 3,2,1: Massive Triples, Binaries and Mergers held at KU, Leuven, Belgium (17-21 July 2023). [link]
- **2023** Presented a *poster* titled: **Distinct populations of Gamma-Ray Bursts using machine learning algorithms** at the ARIES in-house meeting-2023 (23-24 May 2023). [link]

- **2023** Presented a *talk* titled: **GRB 201221D: A high redshift short GRB** at the 3rd BINA WORKSHOP on scientific potential of the Indo-Belgian cooperation (22-24 March 2023). [link]
- **2023** Presented a *talk* titled: **Signature of collapsars in high redshift short GRBs** at the 41st meeting of the Astronomical Society of India (ASI) held at IIT-Indore, India (01-05 March 2023). [link]
- **2023** Presented a *talk* titled: **Gamma Ray Bursts: An Introduction** at Friday Seminar in ARIES Science Club, India (24 February 2023). [link]
- **2022** Presented a *talk* titled: **Deaths from space: Gamma Ray Bursts** at Deen Dayal Upadhyaya Gorakhpur University, Gorakhpur, India (25 November 2022).
- **2022** Presented a *talk* titled: **Characterization of 4K x 4K CCD Camera designed for ADFOSC** at the conference titled: Modern Engineering Trends in Astronomy (META-2022), jointly organised by NCRA, RRI and IIA, Bangalore, India. (14-16 September 2022). [link]
- **2022** Presented a *talk* titled: **Classification conundrum in Gamma Ray Bursts** at the 44th Scientific Assembly of COSPAR held in Athens, Greece (16 -24 July 2022). [link]
- **2022** Presented a *talk* titled: **Tools of Optical Photometry** at ARIES Training School in Observational Astronomy, Nainital, India (16-27 May 2022). [link]
- **2022** Presented a *talk* titled: **Multiwavelength analysis of GRB 201221D** at the conference titled: 3rd Meeting on Star Formation held at ARIES, India (04 -07 April 2022). [link]
- **2022** Presented a *poster* titled: **GRB 210217A: a short or a long GRB?** at the 40th meeting of the Astronomical Society of India (ASI) held at IIT-Roorkee, India (24-29 March 2022). [link]
- **2022** Presented a *poster* titled: **Classification conundrum in Gamma Ray Bursts: Signatures of collapsars in high redshift short GRBs** at the conference titled: Exploring the Transient Universe with the Nancy Grace Roman Space Telescope hosted by Caltech, India (08 - 10 February 2022). [link]
- **2022** Presented a *talk* titled: **Comparison of short GRBs lying at low and high redshifts** at the 21st National Space Science Symposium (NSSS) held at IISER- Kolkata, India (31 January - 04 February 2022). [link]
- **2021** Presented a *talk* titled: **Optical imaging and photometry** at ARIES Training School in Observational Astronomy, Nainital, India (17-24 May 2021). [link]
- **2021** Presented a *talk* titled: **Investigating Short GRBs using 3.6m DOT** at the conference titled: Astrophysical jets and observational facilities: National perspective, ARIES, India (05 - 09 April 2021). [link]
- **2021** Presented a *poster* titled: **Characterization of 4K x 4K CCD Camera** at the 39th meeting of the Astronomical Society of India (ASI) hosted jointly by ICTS - TIFR Bengaluru; IISER, Mohali; IIT, Indore; and IUCAA, Pune; India. (18 - 23 February 2021). [link]

Schools/Workshops

- **2020** Attended **Growth Astronomy School** organised by California Institute of Technology (Caltech); United States (17-21 August 2020). [link]
- **2020** Attended **ILMT: International Liquid Mirror Telescope workshop** held online by ARIES, Nainital; India (29 June - 01 July 2020). [link]
- **2020** Attended an online course on **Deep Learning and its Applications** organised by NIT, Patna, India (17-22 June 2020).

- **2020** Attended **Summer School on Gravitational-Wave Astronomy** organised ICTS-TIFR; India (18 - 22 May, 2020). [link]
- **2020** Attended one day Indo Thai Workshop titled **Investigating the Stellar Variability and Star Formation** held in ARIES, Nainital; India (02 March 2020). [link]
- **2019** Attended **I-TMT (India- TMT) Science and Instruments Workshop** held in ARIES, Nainital; India (17 - 19 October 2019). [link]
- **2019** Attended **IFAS5: 5th Indo-French Astronomy School - Spectroscopy and spectrograph** held at IUCAA, India (16 - 24 August 2019). [link]

Other Activities

- **2024:** Delievered a guest lecture on telescopes at **Sai University**, Chennai on 27th May 2024.
- **2024:** Presented a talk titled *Exploring the Universe: the Role of Telescopes* at International Mathematical Olympiad Training Camp at **CMI, Chennai** on 27th May 2024.
- **2024:** Delivered an interview at **Gateway International School**, addressing student inquiries and promoting awareness on gender equality for their project.
- **2023:** Presented a talk on *Imaging and Photometric Tools in Astronomy* at **CMI, Chennai** on 27th December 2023, addressing school students, to inspire the next generation of astronomers.
- **2023:** Conducted an **outreach activity** and presented a talk on *Telescopes in India* at **CMI, Chennai**, to motivate and educate students about the subject on 19th December 2023.
- **2023:** Co-ordinator of **Aries Science Club (ASC)** at ARIES Nainital, a platform for research scholars to come together and discuss various research methods and practices in an interactive and stimulating environment.
- **2022:** Conducted an **outreach activity** and presented a talk on astronomy at **Jawahar Navodaya Vidyalaya, Nainital**, to motivate and educate students about the subject on 22nd November 2022.
- **2022:** Co-ordinator of the Organizing Committee for **Young Astronomers' Meet (YAM)** held in ARIES Nainital from 09-13 November 2022.
- **2022:** Mentored a group of 6 students selected from various universities during **ARIES Training School on Observational Astronomy (ATSOA)** in May 2022.
- **2022:** Part of local organising committee to organise the conference **104-cm Sampurnanand Telescope Golden Jubilee Workshop** held at ARIES, India.
- **2022:** Part of local organising committee to organise the conference **40th meeting of the Astronomical Society of India (ASI)** held at IIT Roorkee, India.
- **2019:** Part of local organising committee to organise the conference **I-TMT Science and Instruments Workshop** held at ARIES, India.
- **2016**: Organised blood donation camp and multiple camps on gender equity, cleanliness and health care in the rural areas during a 7-day NSS camp.

References

Dr. Kuntal Misra,
Scientist-E, Aryabhatta Research Institute of observational sciencES (ARIES), India.
Pin: 263001, Contact No.: +91 5942 270 742;
Email: kuntal@aries.res.in

Prof. K. G. Arun,
Professor, Chennai Mathematical Institute (CMI), India.
Pin: 603103, Contact No.: +91 44 7196 1056;
Email: kgarun@cmi.ac.in

Dr. T. S. Kumar,
Engineer-F, ARIES, India.
Pin: 263001, Contact No.: +91 5942 270 783;
Email: kumar@aries.res.in

Prof. Resmi Lekshmi,
Associate Professor, Indian Institute of Space Science and Technology (IIST), India.
Pin: 695547, Contact No.: +91 471 2568540;
Email: l.resmi@iist.ac.in

List of Publications

REFEREED

1. *Investigating high redshift short GRBs: signatures of collapsars?* [**Dimple**, Misra, K., & Yadav, L. 2023, Accepted for publication in *'The Bulletin of Liège Royal Society of Sciences'*]
2. *Evidence for Two Distinct Populations of Kilonova-associated Gamma-Ray Bursts.* [**Dimple**, Misra, K., & Arun, K. G. 2023, ApJL, 949, L22]
3. *Characterization of a deep-depletion 4K $\times$ 4K charge-coupled device detector system designed for ARIES Devasthal faint object spectrograph.* [**Dimple**, T.S. Kumar, A. Omar and K. Misra, 2023, JATIS, 9, 018002]
4. *Multiwavelength analysis of short GRB 201221D and its comparison with other high & low redshift short GRBs.* [**Dimple**, Misra, K., Kann, D. A., et al. 2022, MNRAS, 516, 1]
5. *GRB 210217A: a short or a long GRB?* [**Dimple**, Misra, K., Ghosh, A., et al. 2022, JAA, 43, 39]
6. *Prompt emission properties of GRB 200613* [Ghosh A., Misra, K. & **Dimple** 2024, Accepted for publication in *'The Bulletin of Liège Royal Society of Sciences'.*]
7. *Insights into the properties of GRBs with TeV emission* [Misra, K., **Dimple** & Ghosh A. 2023, Accepted for publication in *'The Bulletin of Liège Royal Society of Sciences'.*]
8. *Photometric and spectroscopic analysis of the Type II SN 2020jfo with a short plateau.* [Ailawadhi, B., Dastidar, R., Misra, K. (et al. including **Dimple)** 2023, MNRAS, 519, 248.]
9. *Modeling the late-time merger ejecta emission in short gamma ray bursts.* [Ghosh, A., Misra, K., Cherukuri, S. V. (et al. including **Dimple)** 2022, JAA, 43, 66,]
10. *The long-active afterglow of GRB 210204A: detection of the most delayed flares in a gamma-ray burst.* [Kumar, H., Gupta, R., Saraogi, D. (et al. including **Dimple)** 2022, MNRAS, 513, 2777]

11. *Revealing nature of GRB 210205A, ZTF21aaeyldq (AT2021any), and follow-up observations with the 4K×4K CCD Imager+3.6m DOT.* [Gupta, R., Kumar, A., Pandey, S. B. (et al. including **Dimple)** 2022, JAA, 43, 11]
12. *Probing into emission mechanisms of GRB 190530A using time-resolved spectra and polarization studies: Synchrotron Origin?* [Gupta, R., Gupta, S., Chattopadhyay, T. (et al. including **Dimple)** 2022, MNRAS, 511, 1694]
13. *Magnetar giant flare originating from GRB 200415A: transient GeV emission, time-resolved Ep - Liso correlation and implications.* [Chand, V., Joshi, J. C., Gupta, R. (et al. including **Dimple)** 2021, RAA, 21, 236]
14. *GRB 140102A: Insight into Prompt Spectral Evolution and Early Optical Afterglow Emission.* [Gupta, R., Oates, S. R., Pandey, S. B. (et al. including **Dimple)** 2021, MNRAS, 505, 4086]
15. *Low frequency view of GRB 190114C reveals time varying shock micro-physics.* [Misra, K., Resmi, L., Kann, D. A. (et al. including **Dimple)** 2021, MNRAS, 504, 5685]
16. *Peculiar Prompt Emission and Afterglow in the H.E.S.S.-detected GRB 190829A.* [Chand, V., Banerjee, A., Gupta, R. (et al. including **Dimple)** 2020, ApJ, 898, 42]

NON-REFEREED

Gamma-ray Burst Coordinates Network (GCN) circulars reported with GCN serial number:
26870 • 27473 • 27564 • 27603 • 27764 • 27803 • 27806 • 27838 • 28686 • 28689 • 28772 • 28781 • 28782 • 28789 • 28860 • 29030 • 29091 • 29148 • 29173 • 29257 • 29301 • 29308 • 29345 • 29364 • 29421 • 29488 • 29490 • 29510 • 29518 • 29526 • 29539 • 29569 • 29591 • 29618 • 29654

These GCN circulars can be accessed using the weblink: https://gcn.gsfc.nasa.gov/gcn3/xxx.gcn3, where xxx is GCN serial number.