

Dimple

POST DOCTORAL FELLOW (PDF)

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Research Interests

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

Experience

Post Doctoral Fellow (PDF)

SCHOOL OF PHYSICS AND ASTRONOMY, UNIVERSITY OF BIRMINGHAM

Birmingham, UK

July 2024 - Present

Post Doctoral Fellow (PDF)

CHENNAI MATHEMATICAL INSTITUTE (CMI)

Chennai, India

November 2023 - June 2024

Senior Research Fellow (SRF)

ARYABHATTA RESEARCH INSTITUTE OF OBSERVATIONAL SCIENCES (ARIES)

Nainital, India

July 2020 - November 2023

Junior Research Fellow (JRF)

ARYABHATTA RESEARCH INSTITUTE OF OBSERVATIONAL SCIENCES (ARIES)

Nainital, India

July 2018 - July 2020

Education

PhD, Astronomy and Astrophysics

DEEN DAYAL UPADHYAYA GORAKHPUR UNIVERSITY (DDUGU)

Gorakhpur, India

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 UNIVERSITY KURUKSHETRA

Kurukshetra, India

2016-2018

- Specialization in Nuclear physics and Electronics, passed with first class

Bachelor of Science (B.Sc.)

KURUKSHETRA UNIVERSITY KURUKSHETRA

Kurukshetra, India

2013-2016

- Subjects: Physics, Chemistry, Maths

Awards/Fellowships

- **2025:** Received honorable mention for the Astronomical Society of India's Justice Oak Award for Outstanding Thesis in Astronomy for the year 2024 during the 43rd meeting of the Astronomical Society of India.

- **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.

Teaching Experience

MODULE: LH OBSERVATORY LABORATORY (SEPT 2024- PRESENT)

- Supervising the laboratory sessions for students, guiding them in proposal writing and review, data reduction, and analysis.
- Assisting the students during observational sessions at the observatory, ensuring they could execute approved proposals effectively.

Mentored a group of 6 students selected from various universities during ARIES Training School on Observational Astronomy (ATSOA) in May 2022.

Professional Memberships

- Fellow of the Royal Astronomical Society
- Life member of the Astronomical Society of India (ASI).
- Member of the STARGATE collaboration, dedicated to following up GRBs with ESO facilities
- Member of the Vera Rubin LSST consortium.
- Member of the ENGRAVE collaboration, an international team of European astronomers dedicated to discovering electromagnetic counterparts to gravitational-wave detections.

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*, *Fermiscience tools*, *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

- **James Webb Space Telescope (JWST):**

- Investigating the Origin of High Redshift Short GRB 241105A and Its Implications for GRB Classification and r-Process Enrichment- Cycle 3, DD time of 5.4 hours – **PI**.

- **Devasthal Optical Telescope (DOT):**

- Probing short Gamma-Ray Burst progenitors using optical/NIR counterparts (Cycles 2020-C2, 2021-C1,C2, 2022-C1,C2, 2023-C1,C2) – **PI**.
- Revealing the true energetics of highly energetic LAT detected GRBs using 3.6m DOT (Cycles 2021-C2, 2022-C1,C2, 2023-C1) – **PI**.
- DOT follow-up observations of AstroSat CZTI detected GRBs (Cycles 2020-C2, 2021-C1, C2, 2022-C1,C2, 2023-C1) – **Co-PI**.

- **Himalayan Chandra Telescope (HCT):**

- In search of GRB optical afterglows and relativistic candidates – **Co-PI**.

- **Devasthal Fast Optical Telescope (DFOT):**

- Optical follow-up observation of GRB afterglows (2019–2022) – **PI**.
- Target of Opportunity Observations of Optical Counterparts of Gravitational Wave Sources (2022–2023) – **PI**.

- **Sampoornanand Telescope (ST):**

- Follow-up observations of optical afterglows of GRBs (2019–2023) – **PI**.

Organising Roles

- Present** – Member, seminar organising committee, **School of Physics and Astronomy**, University of Birmingham, organising weekly seminars and colloquia.
- 2022 - 2023** – Co-ordinator, **Aries Science Club (ASC)**, ARIES Nainital, fostering research discussions in a collaborative environment.
- 2022** – Co-ordinator, **Young Astronomers' Meet (YAM)**, ARIES Nainital (09-13 November 2022).
 - Member, local organising committee, **104-cm Sampurnanand Telescope Golden Jubilee Workshop**, ARIES, India.
 - Member, local organising committee, **40th Meeting of the Astronomical Society of India (ASI)**, IIT Roorkee, India.
- 2019** – Helped in organising **I-TMT Science and Instruments Workshop**, ARIES, India.

Outreach and Public Engagement

- 2024** – Volunteer, outreach activities '*Astro In the City*', **University of Birmingham**, 23rd October and 20th November 2024.
 - Guest lecture on *Astronomical Telescopes*, **Sai University**, Chennai, 27th May 2024.
 - Talk titled *Exploring the Universe: The Role of Telescopes*, International Mathematical Olympiad Training Camp, **CMI**, Chennai, 27th May 2024.
 - Interview at **Gateway International School**, promoting awareness on gender equality and addressing student inquiries for their project.
- 2023** – Talk on *Imaging and Photometric Tools in Astronomy*, **CMI**, Chennai, 27th December 2023.
 - Talk on *Telescopes in India*, **CMI**, Chennai, 19th December 2023.
 - Conducted a workshop for school students to make their own telescopes.
- 2022** – Outreach activity and talk on astronomy, **Jawahar Navodaya Vidyalaya**, Nainital, 22nd November 2022.
- 2016** – Organised blood donation camp and multiple campaigns on gender equity, cleanliness, and healthcare during a 7-day NSS camp in rural areas.

Conferences/Schools/Workshops

CONFERENCES

- 2024**
- *Talk: **The Role of Machine Learning in Disentangling the GRB Progenitors***, Inter-STEM Seminar Series, University of Birmingham, UK (13 Nov).
 - *Talk: **Insights into GRB Progenitors using Machine Learning on Fermi Data***, National Astronomy Meet 2024, University of Hull, UK (17 July). [\[link\]](#)
 - *Seminar: **A Data-Driven Approach to GRB Classification: Unveiling Diversity with Machine Learning***, IUCAA, India (4 July). [\[link\]](#)
 - *Poster: **Two Distinct Populations of Kilonova-Associated GRBs Revealed by Machine Learning*** at 42nd Astronomical Society of India Meeting (ASI), IISc.-Bengaluru, India (31 Jan-04 Feb). [\[link\]](#)
 - *Invited Talk: **Role of Machine Learning in Astronomy and Astrophysics***, National Conference on AI in Astronomy, University of Calicut, India (20 Jan).
 - *Talk: **Classification of Gamma-Ray Burst Progenitors Using Machine Learning***, 9th Regional Astronomy Meeting (RAM), Manipal, India (10–12 Jan). [\[link\]](#)
- 2023**
- *Talk: **Insights into the Emission Mechanisms of VHE GRBs***, Advances in Relativistic Astrophysics, ARIES, India (2–4 Nov). [\[link\]](#)
 - *Talk: **Evidence for Two Distinct Populations of Kilonova-Associated GRBs***, 3,2,1: Massive Triples, Binaries, and Mergers, KU Leuven, Belgium (17–21 July). [\[link\]](#)
 - *Poster: **Distinct Populations of GRBs Using Machine Learning Algorithms***, ARIES In-House Meeting, India (23–24 May). [\[link\]](#)
 - *Talk: **GRB 201221D: A High Redshift Short GRB***, 3rd BINA Workshop, ARIES, India (22–24 Mar). [\[link\]](#)
 - *Talk: **Signature of Collapsars in High Redshift Short GRBs***, 41st ASI Meeting, IIT Indore, India (1–5 Mar). [\[link\]](#)
 - *Talk: **Gamma-Ray Bursts: An Introduction***, ARIES Science Club Friday Seminar, India (24 Feb). [\[link\]](#)
- 2022**
- *Talk: **Deaths from Space: Gamma-Ray Bursts***, DDU Gorakhpur University, India (25 Nov).
 - *Talk: **Characterization of 4K x 4K CCD Camera Designed for ADFOSC***, META-2022, NCRA, RRI & IIA, Bangalore, India (14–16 Sep). [\[link\]](#)
 - *Talk: **Classification Conundrum in GRBs***, 44th COSPAR Scientific Assembly, Athens, Greece (16–24 July). [\[link\]](#)
 - *Talk: **Tools of Optical Photometry***, ARIES Training School, Nainital, India (16–27 May). [\[link\]](#)
 - *Talk: **Multiwavelength Analysis of GRB 201221D***, 3rd Star Formation Meeting, ARIES, India (4–7 Apr). [\[link\]](#)
 - *Poster: **GRB 210217A: A Short or Long GRB?***, 40th ASI Meeting, IIT Roorkee, India (24–29 Mar). [\[link\]](#)

- *Poster: **Classification Conundrum in GRBs: Collapsars in High Redshift Short GRBs***, Nancy Grace Roman Telescope Transients Meeting, Caltech, USA (8–10 Feb). [\[link\]](#)
- *Talk: **Comparison of Short GRBs at Low and High Redshifts***, 21st NSSS, IISER Kolkata, India (31 Jan–4 Feb). [\[link\]](#)
- 2021**
 - *Talk: **Optical Imaging and Photometry***, ARIES Training School, Nainital, India (17–24 May). [\[link\]](#)
 - *Talk: **Investigating Short GRBs Using 3.6m DOT***, National Conference on Astrophysical Jets, ARIES, India (5–9 Apr). [\[link\]](#)
 - *Poster: **Characterization of 4K x 4K CCD Camera***, 39th ASI Meeting, India (18–23 Feb). [\[link\]](#)

SCHOOLS/WORKSHOPS

ATTENDANCE:

- 2024**
 - **GOTO Meet 2024**, University of Warwick, UK (3 Sep).
- 2020**
 - **Growth Astronomy School**, Caltech, USA (17–21 Aug). [\[link\]](#)
 - ILMT: International Liquid Mirror Telescope Workshop, ARIES, Nainital, India (29 Jun–1 July). [\[link\]](#)
 - **Deep Learning and Applications**, NIT Patna, India (17–22 Jun).
 - **Summer School on Gravitational-Wave Astronomy**, ICTS-TIFR, India (18–22 May). [\[link\]](#)
 - **Indo-Thai Workshop**, ARIES, Nainital, India (2 Mar). [\[link\]](#)
- 2019**
 - **I-TMT: India-TMT Science and Instruments Workshop**, ARIES, Nainital, India (17–19 Oct). [\[link\]](#)
 - **IFAS5: Indo-French Astronomy School**, IUCAA, India (16–24 Aug). [\[link\]](#)

List of Publications

REFEREED

1. *Rates and beaming angles of GRBs associated with compact binary coalescences* [Kapadiya S., **Dimple**, Jain D. et al. 2024, ApJL, 976, 1]
2. *Diversity in Fermi/GBM Gamma Ray Bursts: New insights from Machine Learning* [**Dimple**, Misra, K., & Arun, K. G. 2024, ApJ, 974, 55]
3. *Evidence for Two Distinct Populations of Kilonova-associated Gamma-Ray Bursts.* [**Dimple**, Misra, K., & Arun, K. G. 2023, ApJL, 949, L22]
4. *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]
5. *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]
6. *GRB 210217A: a short or a long GRB?* [**Dimple**, Misra, K., Ghosh, A., et al. 2022, JAA, 43, 39]
7. *Investigating high redshift short GRBs: signatures of collapsars?* [**Dimple**, Misra, K., & Yadav, L. 2023, 'The Bulletin of Liège Royal Society of Sciences', Volume 93, 2, 670-682]
8. *Insights into the properties of GRBs with TeV emission* [Misra, K., **Dimple** & Ghosh A. 2024, 'The Bulletin of Liège Royal Society of Sciences', Volume 93, 2, 727-737]
9. *Prompt emission properties of GRB 200613* [Ghosh A., Misra, K. & **Dimple** 2024, 'The Bulletin of Liège Royal Society of Sciences', Volume 93, 2, 719-726.]
10. *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.]
11. *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,]
12. *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]
13. *Revealing nature of GRB 210205A, ZTF21aaeyldq (AT2021any), and follow-up observations with the $4K \times 4K$ CCD Imager+3.6m DOT.* [Gupta, R., Kumar, A., Pandey, S. B. (et al. including **Dimple**) 2022, JAA, 43, 11]
14. *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]
15. *Magnetar giant flare originating from GRB 200415A: transient GeV emission, time-resolved E_p - Liso correlation and implications.* [Chand, V., Joshi, J. C., Gupta, R. (et al. including **Dimple**) 2021, RAA, 21, 236]
16. *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]
17. *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]

18. *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.

References

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