Vivek Kumar **Jha**

Project Associate (Scientific)

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Research Interests

• Active galactic nuclei • Quasar accretion disks • AGN multi-wavelength variability • Reverberation Mapping • Supermassive Black Holes • Light curve modelling.

Employment

Project Associate (Scientific) *Nainital, India*

Aryabhatta Research Institute of Observational sciences (ARIES) *April 2022 - present*

- Involved with the scientific aspects of the upcoming data archive for the ARIES 1.04m ST, 1.3m DFOT and 3.6 DOT. This includes homogenizing the data obtained from these telescopes, updating the headers to a common standard, and developing a platform to access the data through a search engine.
- Development of a photometry pipeline to be used across the telescopes at ARIES.

Senior Research Fellow (SRF) *Nainital, India*

Aryabhatta Research Institute of Observational sciences (ARIES) *2020 - 2021*

- Research fellow, pursuing research at this institute leading to the Ph.D. degree at DDU Gorakhpur. Thesis title: *Investigating the Nature and Structure of the Inner Regions in Active Galactic Nuclei.*

Junior Research Fellow (JRF) *Nainital, India*

Aryabhatta Research Institute of Observational sciences (ARIES) *2018 - 2020*

- Research fellow, pursuing research at this institute leading to the Ph.D. degree at DDU Gorakhpur. Thesis title: *Investigating the Nature and Structure of the Inner Regions in Active Galactic Nuclei.*

Education

Doctorate of Philosophy (Ph.D.) in Astrophysics *Gorakhpur, India*

Deen Dayal Upadhyaya Gorakhpur University *2023 (expected)*

- Title of thesis: Investigating the Nature and Structure of the Inner Regions in Active Galactic Nuclei.
- Supervised by: Dr. Hum Chand and co-supervised by Prof. Shantanu Rastogi.
- Research center: ARIES Nainital.

Master of Science (M.Sc.) in Physics *Varanasi, India*

Banaras Hindu University *June 2017*

- Passed with first class and specialization in Space physics.
- Dissertation titled: *Study of properties of CsI as a photo cathode for UV astronomy purposes.*
- Supervised by: Prof. B.K. Singh.

Bachelor of Science (Honors in Physics) *New Delhi, India*

University of Delhi *June 2014*

- College: Deshbandhu College. Passed with first class.

Awards/Fellowships

- **2023**: Financial support to attend a conference in Italy under the International Travel Support (ITS) scheme from the Department of Science and Technology, Government of India.
- **2018**: Junior Research Fellowship (JRF) from the Department of Science and Technology, Government of India.

- **2017**: Selected for Visiting student Internship program at the Indian Institute of Astrophysics (IIA).
- **2017**: Qualified Graduate Aptitude in Engineering (GATE): Physics.
- **2017**: Qualified Joint Entrance Screening Test (JEST): Physics. This exam is conducted for admission to Ph.D. in various research institutes in India.
- **2016**: Indian Space Research Organisation (ISRO) sponsored Space Science Promotion Scheme (SSPS) Fellowship for 1 year.

Technical Skills

Observed extensively using ARIES 1.04m, 1.3m, and 3.6m optical telescopes • Developed a common standard for the 1.3m DFOT data from 2012-present as part of the ARIES telescope archive • Used Thai Robotic Telescopes (TRT) remotely • Experience working with multiple archival data sets • Fluent in PYTHON and working knowledge of IDL • Usage of Git version control • Data reduction using IRAF and astropy packages including CCDPROC, PHOTUTILS, etc. • Developed a custom photometry pipeline in PYTHON language • Usage of LaTeX, HTML and Markdown • Development and maintenance of static websites • OS Used: Linux/ Windows.

Accepted Telescope Proposals

- GROWTH India Telescope (GIT) **Accretion disk reverberation mapping of AGN using the GROWTH telescope GROWTH-ADRM**, cycle 2022-C1, 2022-C2 and 2022-C3 as Co-I. PI: Ravi Joshi.
- 1.3m J C Bose Telescope (JCBT). **Photometric Reverberation Mapping of the low luminosity AGNs** , cycle 2022-C1 as Co-I. PI: Ravi Joshi.
- 3.6m Devasthal Optical Telescope (DOT). **In search of luminous Quasars at the cosmic dawn**, cycle: 2020-C2, as PI.
- 3.6m Devasthal Optical Telescope (DOT). **Host galaxy imaging of γ ray detected Narrow-line Seyfert 1 (γ NlSy1) galaxies.** cycle 2020-C2, 2021-C1, 2021-C2 as Co-I. PI: Vineet Ojha
- VLT-ESO. **Dissecting baryon cycle in overdense environments**, cycle: P106 as Co-I. PI: Ravi Joshi
- 1.04m Sampoornanand telescope (ST). **Intra-night polarization variability of γ ray detected narrow-line Seyfert 1 galaxies.** cycle 2020 (B) as PI.
- 1.04m Sampoornanand telescope (ST). **Changing look Active Galaxies: Unraveling the AGN host and the role of environment in triggering AGN activity.**, cycle 2020 (B) as PI.
- Thai Robotic Telescope (TRT). **Photometric reverberation mapping of the accretion disk in AGN**, cycles: 8A, 7D and 7C as PI.
- ASTROSAT. **Accretion disk reverberation mapping of MRK 817 using Astrosat**, cycle: A11 as PI.
- 1.3m Devasthal Fast Optical telescope (DFOT). **Photometric Reverberation Mapping of the central region of AGN using H-beta emission line**, cycles: 2019 (A), 2019 (B) and 2020 (A), as PI
- 1.04m Sampoornanand telescope (ST). **Multi-wavelength photometric observations of a few Low Red-Shift Broad Line Seyfert 1 Galaxies**, cycles: 2018 (B), 2019 (A), and 2020 (A), as PI

Conferences/Schools/Workshops

Conferences

- **2023** Presented a *talk* titled: **Tools of optical photometry: data reduction and aperture photometry using Python tools.** at the conference titled: Multidisciplinary Approach to Understand

the Mysteries of our Universe, held at National Institute of Technology (NIT) Rourkela, India (17-21 July, 2023).[link]

- **2023** Presented a *poster* titled: **Unveiling the Connection between UV/Optical Variability and Physical Characteristics of X-ray-Selected Type 1 AGN** at the international conference titled: The Restless nature of AGN: 10 years later, held in Naples; Italy (26-30 June, 2023).[link]
- **2023** Presented a *talk* titled: **Accretion disk size measurements for AGN using reverberation mapping** at the 3rd BINA Workshop: Scientific potential of the Indo-Belgian cooperation, held at the Graphic Era Hill University, Bhimtal, India (22-24 March, 2023).[link]
- **2023** Presented a *talk* titled: **New Accretion disk size measurements for reverberation mapped AGN.** 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: **Eyes on the Sky: Current and upcoming telescopes of this decade.** at Deen Dayal Upadhyaya Gorakhpur University, Gorakhpur, India (06 Jan 2023).
- **2022** Presented a *talk* titled: **Introduction to CosmicVarta: Platform for promoting Indian astronomy research to the public.** at ARIES Training School in Observational Astronomy, Nainital, India (16-27 May 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 *poster* titled: **Accretion disk sizes for Quasars selected from the Zwicky Transient Facility survey** at the 40th meeting of the Astronomical Society of India (ASI) held at IIT-Roorkee, India (24-29 March 2022).[link]
- **2022** Presented a *talk* titled: **A look into the heart of Quasars: using light echos as a tool** at Central University of Himachal Pradesh (CUHP), Dharamshala; India on 3rd February. [link]
- **2021** Presented a *poster* titled: **Correlation analysis on a homogeneous sample of NlSy1 and BlSy1 galaxies** at the workshop titled "Multi-object Spectroscopy for Statistical Measures of Galaxy Evolution" held online by Space Telescope Science Institute (STScI), Baltimore; USA (17-20 May 2021). [link]
- **2020** Presented a *talk* titled: **A comparative study of Narrow and Broad-line Seyfert galaxies using SDSS** at an international symposium titled "Astronomical Surveys and Big Data 2 (ASBD-2)" held online by the Byurakan Astrophysical Observatory (BAO); Armenia (14-18 September 2020) [link]
- **2019** Presented a *poster* titled: **Devasthal Optical Telescope-AGN Reverberation Monitoring(DOT-ARM): Project strategy and initial results** at the international conference titled "Mapping Central Regions of Active Galactic Nuclei" held in Guilin, Guanxi Province; China (19-24 September 2019). [link]

SCHOOLS/WORKSHOPS ATTENDED:

- **2021** Attended International Summer School on **The Interstellar Medium of Galaxies, from the Epoch of Reionization to the Milky Way**, held online from July 12-23, 2021. [link]
- **2020** Attended workshop titled: **Less traveled path of dark matter: Axions and primordial black holes**, held online by ICTS-TIFR; India between November 9-13, 2020. [link]
- **2020** Attended **ILMT: International Liquid Mirror Telescope workshop** held online by ARIES, Nainital; India (29 June - 01 July 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]

Mentoring Experience

- **2023:** Partial guidance to Mr. Jayesh Saraswat for his M Sc. dissertation at SPPU, Pune.
- **2022:** Mentored a group of 6 students selected from various universities during ARIES Training School on Observational Astronomy (ATSOA) in May 2022.
- **2021:** Guided M Sc. dissertation of Mr. Dharmendra at CUHP, Dharamshala
- **2019:** Mentored a group of 7 students selected from various universities during ARIES Training School on Observational Astronomy (ATSOA) in March 2019.

Other Activities

- **2022:** Chair of the Organizing Committee for **Young Astronomers' Meet (YAM)** held in ARIES Nainital from 09-13 November 2022.
- **2021:** Co-founded a web portal named **CosmicVarta**, a platform to present simplified versions of research articles in astrophysics to the general public.
- **2021:** Helped in organizing the ARIES National Science Day celebrations (28 February) held online.
- **2020:** Helped in organizing the *ARIES e-lecture series* in place of the ARIES Training School on Observational Astronomy (ATSOA) which was canceled due to the COVID-19 pandemic.

Professional Memberships

- Student member of the Astronomical Society of India (ASI).

Publications

Refereed

1. Unveiling the Connection between UV/Optical Variability and Physical Characteristics of X-ray-Selected Type 1 AGN **Vivek Kumar Jha**, Ravi Joshi, Hum Chand. (*under preparation*)
2. Exploring the AGN Accretion Disks using Continuum Reverberation Mapping. **Vivek Kumar Jha**, Ravi Joshi, Jayesh Saraswat, Hum Chand, Sudhanshu Barway and Amit Kumar Mandal, *submitted to* the Bulletin of Liège Royal Society of Sciences, 2023.
3. Accretion Disk Sizes from Continuum Reverberation Mapping of AGN Selected from the ZTF Survey. **Vivek Kumar Jha**, Ravi Joshi, Hum Chand, Xue-Bing Wu, Luis C Ho, Shantanu Rastogi, Quinchun Ma, *Monthly Notices of the Royal Astronomical Society, Volume 511, Issue 2, 2022.*
4. A comparative study of the physical properties for a representative sample of Narrow and Broad-line Seyfert galaxies. **Vivek Kumar Jha**, Hum Chand, Vineet Ojha, Amitesh Omar, and Shantanu Rastogi, *Monthly Notices of the Royal Astronomical Society, Volume 510, Issue 3, 2022.*
5. Properties of Broad and Narrow Line Seyfert galaxies selected from SDSS. **Vivek Kumar Jha**, Hum Chand, and Vineet Ojha, *Communications of the Byurakan Astrophysical Observatory (ComBAO), Volume 67, Issue 2, 2020.*
6. Evidence of Jet induced Optical Microvariability in Radio-loud Narrow Line Seyfert 1 Galaxies. Vineet Ojha,**Vivek Kumar Jha**, Hum Chand, Veeresh Singh, *Monthly Notices of the Royal Astronomical Society, Volume 514, Issue 4, 2022.*

7. Photometric and Spectroscopic Analysis of the Type II Short Plateau SN 2020jfo. Ailawadhi, Bhavya (et al. including **Vivek Kumar Jha**) *Monthly Notices of the Royal Astronomical Society, Volume 519, Issue 1, 2023.*
8. The impact of humidity and film thickness on photoemission, optical and morphological properties of CsI thin film photocathodes. Nabeel Jammal, Richa Rai, Triloki, **Vivek Kumar Jha** and B.K. Singh, *Thin Solid Films, Volume 674, pp:82-90, 2019.*
9. Optical properties of ”as-deposited” CsI photocathode in the VUV-UV spectral range. **Vivek Kumar Jha**, Nabeel Jammal, Triloki and B K Singh, *Proceedings of the DAE Symposium on Nuclear Physics Volume 62, pp:1082, 2017.*

Non-refereed

1. Optical brightening of BL Lacertae observed on 26 October and 02 November 2022, Pandey, Ashwani; Sarswat, Jayesh; Joshi, Ravi; **Jha, Vivek Kumar**; Wani,Kiran, *The Astronomer's Telegram 15749, 2022*.
2. GRB 200122A: Optical upper limit Dimple, Gupta R., **Jha V. K.**, Aryan A., Ghosh A., Misra K., Kumar A., et al., 2020, GCN, 26870.

References

1. **Prof. Hum Chand**, Professor of Physics, CUHP, Dharamshala. Email: hum (at) aries.res.in
2. **Dr. Abhay Kumar Singh**, Professor of Physics, BHU, Varanasi. Email: singhak (at) bhu.ac.in
3. **Dr. Shantanu Rastogi**, Professor of Physics, DDU, Gorakhpur. Email: shantanur (at) hotmail.com