

Abhijeet Anand, PhD

Independent Postdoctoral Fellow

Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India

email: abhijeet.anand@iucaa.in, *website:* <https://abhi0395.github.io/>, Google Scholar

Research Interests

Astrophysicist specializing in galaxy formation and evolution, the circumgalactic and intergalactic medium, quasar absorption-line systems, and cosmology. My research combines large photometric and spectroscopic surveys (e.g., DESI, SDSS, 4MOST, WEAVE) with data-intensive computational methods to study cosmic gas flows, the baryon cycle, and metal enrichment in the Universe. I am also interested in connecting observations with state-of-the-art cosmological simulations (e.g., TNG, EAGLE) by comparing observed quantities with theoretical predictions and testing simulation-based predictions directly against survey data. My long-term vision is to build an independent research program at the intersection of next-generation surveys, advanced computational methods, and the physics of galaxy evolution.

Professional Experience

Dec 2025 - present: Independent Postdoctoral Fellow, IUCAA, Pune, India

Feb 2026 - present: Affiliate Scientist, Lawrence Berkeley National Lab, Berkeley, CA, USA

- *Leading independent projects on characterizing the global statistical properties of metals and their evolution in the Universe.*
- *Exploring physical properties of gas in and around galaxies using MHD simulations and observations from MUSE, SDSS and DESI.*
- *Builder and support scientist for the DESI's redshift fitter pipeline.*

Sep 2022 - Oct 2025: Postdoctoral Fellow, Lawrence Berkeley National Lab, Berkeley, CA, USA

- *Led independent projects on metal absorbers in and around galaxies using DESI, producing the largest metal absorber catalogs.*
- *Developer and support scientist for the DESI's spectral reduction pipeline; improved redshift estimation algorithms, reducing catastrophic failures by $\sim 30\%$.*
- *Contributed to high-impact DESI collaboration papers, while also initiating and reviewing independent science projects within and outside the collaboration.*

Sep 2018 - Jul 2022: PhD Fellow, Max Planck Institute for Astrophysics, Garching, Germany

- *Conducted extensive studies on the gas distribution in the circumgalactic and intracluster medium using data from SDSS and the legacy imaging survey.*
- *Developed the quasar absorber finder, `qsoabsfind`, a tool used for detecting and analyzing metal absorbers in low-resolution quasar spectra.*

Sep 2017 - Jul 2018: UGC - JRF¹, National Institute of Advanced Studies, Bangalore, India

Education

Sep 2018 - Jul 2022: PhD in Astrophysics, Ludwig Maximilian University - Max Planck Institute for Astrophysics (MPA), Germany.

¹University Grants Commission, Govt. of India - Junior Research Fellowship

- Thesis: Probing cool and warm circumgalactic gas in galaxies and clusters with large spectroscopic and imaging surveys
- Advisors: Prof. Dr. Guinevere Kauffmann & Dr. Dylan Nelson

Jul 2016 - Jul 2017: MS, Physics, Indian Institute of Science (IISc), Bangalore, India.

- Thesis: A sensitive search for HI 21 cm emission from super disks in radio galaxies
- Advisor: Prof. Nirupam Roy

Aug 2012 - June 2016: BSc (Research), Physics, Indian Institute of Science, Bangalore, India.

- Thesis: Sources of Continuum Opacity in Hydrogen deficient stars
- Advisors: Prof. Gajendra Pandey, Indian Institute of Astrophysics (IIA)

Selected visits, talks and conferences

ⁱInvited Talks, ^cContributed Talks, ^sSchools & Workshops

- ⁱ June 2025: *Astro Webinar*, Raman Research Institute, Bangalore, India, June 23, 2025 (*Virtual*)
- ⁱ May 2025: *Astro Lunch seminar*, University of Washington, Seattle, USA, May 20, 2025 (*talk*)
- ⁱ Dec 2024: *Joint Astronomy Program Seminar*, IISc, Bangalore, India, Dec 11, 2024 (*talk*)
- ^c Dec 2024: *Baryons Beyond Galactic Boundaries*, IUCAA Pune, India, Dec 2 - Dec 6, 2024 (*talk*)
- ^c Nov 2024: *ISSAC Conference*, St. Stephen's College, New Delhi, Nov 20 - Nov 22, 2024 (*talk*)
- ⁱ Feb 2024: *Extragalactic Seminar*, MPA Garching, Germany, Feb 29, 2024 (*talk*).
- ⁱ Feb 2024: *Cosmology Seminar*, MPA Garching, Germany, Feb 27, 2024 (*talk*).
- ⁱ Mar 2022: *Computational Galaxy Formation and Evolution Group*, ZAH/ITA, University of Heidelberg, 14-16 Mar 2022 (*Visitor*).
- ⁱ Feb 2022: *High Energy Group Seminar*, MPE Garching, 15 Feb, 2022 (*Virtual*).
- ⁱ Feb 2022: *DESI Group Seminar*, Berkeley Lab, 1 Feb, 2022 (*Virtual*).
- ⁱ Dec 2021: *Galaxies & Cosmology Seminar*, CfA Harvard, 13 Dec, 2021 (*Virtual*).
- ⁱ Sep 2021: *STARs lab*, Arizona State University, 24 Sep, 2021 (*Virtual*).

Mentoring

- Paryag Sharma (CUHP PhD): project on exploring CGM of quasars and AGNs using SDSS and DESI (manuscript in prep.), (2026 - present).
- Joanne Tan (MPA PhD): project on metal absorbers in TNG-100 simulations (manuscript in prep.), (2025 - present).
- Corey Dodeson (UC Berkeley UG) (short-term reading project on CGM), 2023

Honors & Awards

- **DESI Builder Award (2025)** for outstanding contributions to the data systems operations.
- Core member of the DESI Data Team; the DESI Collaboration awarded the 2026 **Berkeley Prize** of American Astronomical Society.
- DESI Early Career Travel Grant to attend conferences in 2024-2025.
- **IMPRS PhD Fellowship**, 2018–2022.
- University Grants Commission - Junior Research Fellowship of Govt. of India, 2017-2018.
- Department of Science & Technology, Govt. of India - Higher Studies Scholarship, 2012-2017.

Programming skills

Programming Language —

- Python (numpy, scipy, astropy, scikit-learn, matplotlib), bash, SQL with focus on high-performance, large-scale survey pipelines.

Tools & Workflows —

- Git, Jupyter, slurm (NERSC), LaTeX, Unix/Linux

Open-source Contributions —

- [qsoabsfind](#): QSO metal absorber finder (*sole Developer*)
- [redrock](#): Redshift fitter for DESI (*Main Contributor*).
- [desispec](#): DESI spectroscopic pipeline(*Contributor*).

Professional services & activities

Referee —

- Astronomy & Astrophysics (2023-), Astrophysical Journal (2023-), Internal Reviewer for DESI papers (2023-)

Member & Organizer—

- Core committee member, IUCAA Computing Facilities, (202627)
- Core committee member, [DESI Professional Development Committee](#), (202425), contributed to early-career support and mentoring initiatives.
- Organizer, [INPA Weekly Seminar](#), Physics Division, LBNL (2023-2024).

Teaching Experience —

- Served as online physics tutor at E-acharya (>20 students)² from June 2017 to Aug 2018.

Outreach activities

Press releases —

- My papers ([I](#), [II](#)) featured in the monthly research highlight of MPA and appeared on [astrobites](#).

Interviews & podcast —

- Interviewed by [Vidpeds podcast](#) to discuss my astronomy journey and how people from small cities can become successful astronomers.
- Gave [interview](#) to [The Interview Portal](#) to help Indian college students plan their careers.

Public Presentations —

- Presented pedagogical and scientific posters for general public on National Science Day 2026, IUCAA, Pune, India.

Publications

Total: 46 / refereed: 26 / first author: 5 / citations: 5,117 / h-index: 19 (Last updated: 2026-03-01), List attached below

First-author publications

- ⁵ **Anand, Abhijeet**; Aguilar, J.; Ahlen, S.; Bianchi, D.; Brodzeller, A.; et al., 2025, [The Cosmic Evolution of C IV Absorbers at 1.4 < z < 4.5: Insights from 100,000 Systems in DESI Quasars](#), The Astrophysical Journal, **990**, 151 ([arXiv:2504.20299](#)) [4 citations]

²an initiative to help poor students in suburban and rural areas of Bihar, India.

- ⁴ **Anand, Abhijeet**; Guy, Julien; Bailey, Stephen; Moustakas, John; Aguilar, J.; *et al.*, 2024, *Archetype-based Redshift Estimation for the Dark Energy Spectroscopic Instrument Survey*, The Astronomical Journal, **168**, 124 (arXiv:2405.19288) [35 citations]
- ³ **Anand, Abhijeet**; Kauffmann, Guinevere; & Nelson, Dylan, 2022, *Cool circumgalactic gas in galaxy clusters: connecting the DESI legacy imaging survey and SDSS DR16 Mg II absorbers*, Monthly Notices of the Royal Astronomical Society, **513**, 3210 (arXiv:2201.07811) [27 citations]
- ² **Anand, Abhijeet**; Nelson, Dylan; & Kauffmann, Guinevere, 2021, *Characterizing the abundance, properties, and kinematics of the cool circumgalactic medium of galaxies in absorption with SDSS DR16*, Monthly Notices of the Royal Astronomical Society, **504**, 65 (arXiv:2103.15842) [58 citations]
- ¹ **Anand, Abhijeet**; Roy, Nirupam; & Gopal-Krishna, 2019, *Search for H I emission from superdisk candidates associated with radio galaxies*, Research in Astronomy and Astrophysics, **19**, 083 (arXiv:1812.06875) [2 citations]

Significant contributions

- ⁷ Napolitano, Lucas; Myers, Adam D.; Tedeschi, Adam; **Anand, Abhijeet**; Herrera-Alcantar, Hiram K.; *et al.*, 2025, *The Composite Spectrum of QSO Absorption Line Systems in DESI DR2*, ArXiv, arXiv:2512.02992 (arXiv:2512.02992)
- ⁶ Lan, Ting-Wen; Prochaska, J. Xavier; Aguilar, J.; Ahlen, S.; **Anand, Abhijeet**; *et al.*, 2025, *The Multi-Phase Circumgalactic Medium of DESI Emission-Line Galaxies at z 1.5*, ArXiv, arXiv:2511.03195 (arXiv:2511.03195) [1 citations]
- ⁵ Wu, Xuanyi; Cai, Z.; Lan, T.-W.; Zou, S.; **Anand, Abhijeet**; *et al.*, 2025, *Tracing the Evolution of the Cool Gas in CGM and IGM Environments through Mg II Absorption from Redshift z = 0.75 to z = 1.65 Using DESI-Y1 Data*, The Astrophysical Journal, **983**, 186 (arXiv:2407.17809) [10 citations]
- ⁴ Chang, Yu-Ling; Lan, Ting-Wen; Prochaska, J. Xavier; Napolitano, Lucas; **Anand, Abhijeet**; *et al.*, 2024, *Probing the Impact of Radio-mode Feedback on the Properties of the Cool Circumgalactic Medium*, The Astrophysical Journal, **974**, 191 (arXiv:2405.08314) [8 citations]
- ³ Galiullin, Ilkham; Rodriguez, Antonio C.; El-Badry, Kareem; Szkody, Paula; **Anand, Abhijeet**; *et al.*, 2024, *Searching for new cataclysmic variables in the Chandra Source Catalog*, Astronomy and Astrophysics, **690**, A374 (arXiv:2408.00078) [5 citations]
- ² Napolitano, Lucas; Pandey, Agnesh; Myers, Adam D.; Lan, Ting-Wen; **Anand, Abhijeet**; *et al.*, 2023, *Detecting and Characterizing Mg II Absorption in DESI Survey Validation Quasar Spectra*, The Astronomical Journal, **166**, 99 (arXiv:2305.20016) [27 citations]
- ¹ Ayromlou, Mohammadreza; Kauffmann, Guinevere; **Anand, Abhijeet**; & White, Simon D. M., 2023, *The physical origin of galactic conformity: from theory to observation*, Monthly Notices of the Royal Astronomical Society, **519**, 1913 (arXiv:2207.02218) [29 citations]

Collaboration Papers

- ³⁴ Hsu, Yuan-Ming; Huang, Xiaosheng; Storfer, Christopher J.; Inchausti, Jose Carlos; Schlegel, David; *et al.* (incl. **A. Anand**), 2026, *A New Way to Discover Strong Gravitational Lenses: Pairwise Spectroscopic Search from DESI DR1*, The Astrophysical Journal Supplement Series, **282**, 41 (arXiv:2509.16033) [2 citations]
- ³³ Kamalinejad, Farshad; Slepian, Zachary; Krolewski, Alex; Greco, Alessandro; Ortolá Leonard,

- William; et al. (incl. **A. Anand**), 2026, *First Detection of the Baryon Acoustic Oscillation (BAO) Feature in the 3-Point Correlation Function of DESI DR1 Luminous Red Galaxies*, ArXiv, arXiv:2602.16134 (arXiv:2602.16134)
- 32 Han, Jiwon Jesse; Chiti, Anirudh; Chen, Kai-Feng; Bechtol, Keith; Bellini, Andrea; et al. (incl. **A. Anand**), 2026, *A Path to an All-Sky Survey with Roman*, ArXiv, arXiv:2602.21280 (arXiv:2602.21280)
- 31 Chang, Yu-Ling; Lan, Ting-Wen; Prochaska, J. Xavier; Siudek, Malgorzata; Aguilar, J.; et al. (incl. **A. Anand**), 2025, *Tracing the Cosmic Evolution of the Cool Circumgalactic Medium of Luminous Red Galaxies with DESI Year 1 Data*, ArXiv, arXiv:2512.03845 (arXiv:2512.03845)
- 30 Lange, Johannes U.; Wells, Alexandra; Hearin, Andrew; Beltz-Mohrmann, Gillian; Leauthaud, Alexie; et al. (incl. **A. Anand**), 2025, *Cosmological Constraints from Full-Scale Clustering and Galaxy-Galaxy Lensing with DESI DR1*, ArXiv, arXiv:2512.15962 (arXiv:2512.15962) [2 citations]
- 29 Herrera-Alcantar, Hiram K.; Armengaud, Eric; Yèche, Christophe; Gordon, Calum; Casas, Laura; et al. (incl. **A. Anand**), 2025, *The Lyman- α forest from LBGs: First 3D correlation measurement with DESI and prospects for cosmology*, Journal of Cosmology and Astroparticle Physics, **2025**, 053 (arXiv:2507.21852) [4 citations]
- 28 Blanco, Diana; Leauthaud, Alexie; Ulf Lange, Johannes; Wright, Angus H.; Hildebrandt, Hendrik; et al. (incl. **A. Anand**), 2025, *The Power of DESI for Photometric Redshift Calibration: A Case Study with KiDS-1000*, ArXiv, arXiv:2512.15964 (arXiv:2512.15964) [1 citations]
- 27 Moore, Samuel G.; Cole, Shaun; Wilson, Michael; Norberg, Peder; Moustakas, John; et al. (incl. **A. Anand**), 2025, *DESI DR2 Galaxy Luminosity Functions*, ArXiv, arXiv:2511.01803 (arXiv:2511.01803) [3 citations]
- 26 McArthur, Everett; Millon, Martin; Powell, Meredith; Wechsler, Risa H.; Pan, Zhiwei; et al. (incl. **A. Anand**), 2025, *Quasars acting as Strong Lenses Found in DESI DR1*, ArXiv, arXiv:2511.02009 (arXiv:2511.02009) [1 citations]
- 25 Uzsoy, Ana Sofía M.; Dey, Arjun; Raichoor, Anand; Finkbeiner, Douglas P.; Ramakrishnan, Vandana; et al. (incl. **A. Anand**), 2025, *Effect of local environment on Ly α line profile in DESI/ODIN LAEs*, ArXiv, arXiv:2511.17498 (arXiv:2511.17498)
- 24 Crespi, Andrea; Percival, Will J.; Krolewski, Alex; Bonici, Marco; Zhang, Hanyu; et al. (incl. **A. Anand**), 2025, *Baryon fraction from the BAO amplitude: a consistent approach to parameterizing perturbation growth*, ArXiv, arXiv:2511.23459 (arXiv:2511.23459)
- 23 Abdul Karim, M.; Aguilar, J.; Ahlen, S.; Alam, S.; Allen, L.; et al. (incl. **A. Anand**), 2025, *DESI DR2 results. II. Measurements of baryon acoustic oscillations and cosmological constraints*, Physical Review D, **112**, 083515 (arXiv:2503.14738) [879 citations]
- 22 Abdul Karim, M.; Aguilar, J.; Ahlen, S.; Allende Prieto, C.; Alves, O.; et al., 2025, *DESI DR2 results. I. Baryon acoustic oscillations from the Lyman alpha forest*, Physical Review D, **112**, 083514 (arXiv:2503.14739) [159 citations]
- 21 Brodzeller, A.; Wolfson, M.; Santos, D. M.; Ho, M.; Tan, T.; et al. (incl. **A. Anand**), 2025, *Construction of the damped Ly α absorber catalog for DESI DR2 Ly α BAO*, Physical Review D, **112**, 083510 (arXiv:2503.14740) [19 citations]
- 20 Zaborowski, E. A.; Taylor, P.; Honscheid, K.; Cuceu, A.; de Mattia, A.; et al. (incl. **A. Anand**), 2025, *H_0 Without the Sound Horizon (or Supernovae): A 2% Measurement in DESI DR1*, ArXiv, arXiv:2510.19149 (arXiv:2510.19149) [2 citations]
- 19 Rashkovetskyi, Michael; Eisenstein, Daniel J.; Aguilar, Jessica Nicole; Ahlen, Steven; **Anand**,

- Abhijeet; et al.**, 2025, *Clustering of DESI galaxies split by thermal Sunyaev-Zeldovich effect*, The Open Journal of Astrophysics, **8**, 46033 (arXiv:2508.20904)
- 18 Adame, A. G.; Aguilar, J.; Ahlen, S.; Alam, S.; Alexander, D. M.; et al. (incl. **A. Anand**), 2025, *DESI 2024 V: Full-Shape galaxy clustering from galaxies and quasars*, Journal of Cosmology and Astroparticle Physics, **2025**, 008 (arXiv:2411.12021) [145 citations]
- 17 Treiber, Helena; Amon, Alexandra; Wechsler, Risa H.; Manwadkar, Viraj; Myles, Justin; et al. (incl. **A. Anand**), 2025, *Dwarf galaxy halo masses from spectroscopic and photometric lensing in DESI and DES*, ArXiv, arXiv:2509.20434 (arXiv:2509.20434) [1 citations]
- 16 Cuceu, Andrei; Herrera-Alcantar, Hiram K.; Gordon, Calum; Ramírez-Pérez, César; Armengaud, E.; et al. (incl. **A. Anand**), 2025, *DESI DR1 Ly α forest: 3D full-shape analysis and cosmological constraints*, ArXiv, arXiv:2509.15308 (arXiv:2509.15308) [7 citations]
- 15 Ebina, H.; White, M.; Raichoor, A.; Dey, Arjun; Schlegel, D.; et al. (incl. **A. Anand**), 2025, *Clustering analysis of medium-band selected high-redshift galaxies*, ArXiv, arXiv:2509.26467 (arXiv:2509.26467) [3 citations]
- 14 Turner, Wynne; Cuceu, Andrei; Martini, Paul; Aguilar, J.; Ahlen, S.; et al., 2025, *Probing the limits of cosmological information from the Lyman- α forest 2-point correlation functions*, ArXiv, arXiv:2509.14322 (arXiv:2509.14322) [1 citations]
- 13 Karaçaylı, N. G.; Ravoux, C.; Martini, P.; Le Goff, J. M.; Armengaud, E.; et al. (incl. **A. Anand**), 2025, *DESI DR1 Ly α 1D power spectrum: Validation of estimators*, ArXiv, arXiv:2509.13593 (arXiv:2509.13593) [3 citations]
- 12 Medina, Gustavo E.; Li, Ting S.; Eadie, Gwendolyn M.; Riley, Alexander H.; Valluri, Monica; et al. (incl. **A. Anand**), 2025, *The mass of the Milky Way from outer halo stars measured by DESI DR1*, ArXiv, arXiv:2508.19351 (arXiv:2508.19351) [1 citations]
- 11 Adame, A. G.; Aguilar, J.; Ahlen, S.; Alam, S.; Alexander, D. M.; et al. (incl. **A. Anand**), 2025, *DESI 2024 VII: cosmological constraints from the full-shape modeling of clustering measurements*, Journal of Cosmology and Astroparticle Physics, **2025**, 028 (arXiv:2411.12022) [255 citations]
- 10 Adame, A. G.; Aguilar, J.; Ahlen, S.; Alam, S.; Alexander, D. M.; et al. (incl. **A. Anand**), 2025, *DESI 2024 II: sample definitions, characteristics, and two-point clustering statistics*, Journal of Cosmology and Astroparticle Physics, **2025**, 017 (arXiv:2411.12020) [103 citations]
- 9 Adame, A. G.; Aguilar, J.; Ahlen, S.; Alam, S.; Alexander, D. M.; et al. (incl. **A. Anand**), 2025, *DESI 2024 III: baryon acoustic oscillations from galaxies and quasars*, Journal of Cosmology and Astroparticle Physics, **2025**, 012 (arXiv:2404.03000) [450 citations]
- 8 DESI Collaboration; Abdul-Karim, M.; Adame, A. G.; Aguado, D.; Aguilar, J.; et al. (incl. **A. Anand**), 2025, *Data Release 1 of the Dark Energy Spectroscopic Instrument*, ArXiv, arXiv:2503.14745 (arXiv:2503.14745) [314 citations]
- 7 Adame, A. G.; Aguilar, J.; Ahlen, S.; Alam, S.; Alexander, D. M.; et al. (incl. **A. Anand**), 2025, *DESI 2024 VI: cosmological constraints from the measurements of baryon acoustic oscillations*, Journal of Cosmology and Astroparticle Physics, **2025**, 021 (arXiv:2404.03002) [1400 citations]
- 6 Adame, A. G.; Aguilar, J.; Ahlen, S.; Alam, S.; Alexander, D. M.; et al. (incl. **A. Anand**), 2025, *DESI 2024 IV: Baryon Acoustic Oscillations from the Lyman alpha forest*, Journal of Cosmology and Astroparticle Physics, **2025**, 124 (arXiv:2404.03001) [333 citations]
- 5 Ross, A. J.; Aguilar, J.; Ahlen, S.; Alam, S.; **Anand, Abhijeet**; et al., 2025, *The construction of large-scale structure catalogs for the Dark Energy Spectroscopic Instrument*, Journal of Cosmology and Astroparticle Physics, **2025**, 125 (arXiv:2405.16593) [43 citations]

- ⁴ Scholte, Dirk; Saintonge, Amélie; Moustakas, John; Catinella, Barbara; Zou, Hu; *et al.* (incl. **A. Anand**), 2024, *The atomic gas sequence and mass-metallicity relation from dwarfs to massive galaxies*, Monthly Notices of the Royal Astronomical Society, **535**, 2341 (arXiv:2408.03996) [21 citations]
- ³ DESI Collaboration; Adame, A. G.; Aguilar, J.; Ahlen, S.; Alam, S.; *et al.* (incl. **A. Anand**), 2024, *The Early Data Release of the Dark Energy Spectroscopic Instrument*, The Astronomical Journal, **168**, 58 (arXiv:2306.06308) [480 citations]
- ² DESI Collaboration; Adame, A. G.; Aguilar, J.; Ahlen, S.; Alam, S.; *et al.* (incl. **A. Anand**), 2024, *Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument*, The Astronomical Journal, **167**, 62 (arXiv:2306.06307) [271 citations]
- ¹ Han, Jiwon Jesse; Dey, Arjun; Price-Whelan, Adrian M.; Najita, Joan; Schlafly, Edward F.; *et al.* (incl. **A. Anand**), 2023, *NANCY: Next-generation All-sky Near-infrared Community survey*, ArXiv, arXiv:2306.11784 (arXiv:2306.11784) [8 citations]