

VIKRAM KHAIRE

PERSONAL DATA

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ACADEMIC TIMELINE

2023- now	Assistant Project Scientist Department of Physics, University of California, Santa Barbara, CA 93106, USA
2020- now	DST INSPIRE Faculty (currently on sabbatical at UCSB) Indian Institute of Space Science & Technology (IIST), Thiruvananthapuram, Kerala 695547, India
2017- 2020	Post-doctoral Research Scholar Department of Physics, University of California, Santa Barbara, CA 93106, USA
2016-2017	Post-doctoral Research fellow National Centre for Radio Astrophysics (NCRA), Tata Institute of Fundamental Research, Pune 411007, India
2010-2016	Doctor of Philosophy (PhD) in Physics Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India (Degree awarded by Jawaharlal Nehru University, New Delhi; on 13 August 2017) Thesis title: <i>"Intergalactic Medium & Cosmic Background Radiation"</i> Advisor: Prof. Raghunathan Srianand
2008-2010	Master of Science (Physics) Department of Physics, Savitribai Phule Pune University (formerly known as University of Pune), Pune, India GPA: 4.5 out of 6; Grade: A

RESEARCH GRANTS

- (1) Hubble Space Telescope Cycle 30, “Searching for the Imprints of AGN Feedback on the Lyman- α Forest Around Massive Quenched Galaxies” (proposal ID: AR 17048)
- (2) DST-INSPIRE Faculty Fellowship 2019, by Department of Science and Technology (DST), India (5 year faculty fellowship)
- (3) Hubble Space Telescope Cycle 25, “Filling the Void: A Comprehensive Survey of the Intergalactic Medium at $z \sim 1$ Using STIS/COS Archival Spectra” (proposal ID: AR 1503)
- (4) Junior Research Fellowship 2012, by Council of Scientific and Industrial Research (CSIR) India (4 year graduate school fellowship)

TEACHING EXPERIENCE

1. Galaxies - Structure, Dynamics and Evolution (ESA622), **10 classes**
MS Astronomy & Astrophysics, IIST, Thiruvananthapuram, Kerala, India (April 2023)
2. Cosmology (ESA623), **20 classes**
MS Astronomy & Astrophysics, IIST, Thiruvananthapuram, Kerala, India (Feb-April 2022)
3. Computational Astrophysics (ESA614), **20 classes & 12 hands-on lab sessions**
MS Astronomy & Astrophysics, IIST, Thiruvananthapuram, Kerala, India (August-Oct., 2021)
4. Data Analysis Astronomy Lab (ESA631), **> 10 classes**
MS Astronomy & Astrophysics, IIST, Thiruvananthapuram, Kerala, India (October, 2021-2023)
5. Cosmology (ESA623), **12 classes**
MS Astronomy & Astrophysics, IIST, Thiruvananthapuram, Kerala, India (April-May, 2021)
6. Galaxies & Cosmology, **5 classes**
IIST Astronomy and Astrophysics Winter School 2020, India, (18-28 December, 2020)
7. **Miscellaneous:** Arond 20 Night Sky lab sessions in IIST (year 2021-2023), data analysis lab for Astronomy and Astrophysics School at IIST (year 2022) and Tutor of Galaxies class at IUCAA-NCRA Graduate School (year 2015).

ADVISING EXPERIENCE

- **Ph.D. Projects Co-Guided**

I have co-guided projects for three Ph.D. students: Dr. Abhisek Mohapatra, Mr. Teng Hu, and Dr. Tanvir Hussain, resulting in five papers (three published and two under review).

- **Masters & Bachelor Student Projects**

I have supervised six projects for Master's students. Notable examples include Mr. Anshuman Acharya (MPA Garching) and Mr. Dheerajkumar Khonde (Physical Research Laboratory,

Ahmedabad), whose project resulted in publications. While two students are currently working on converting their projects in to paper drafts [Ms. Ushasi Bhowmich (Space Application Centre, Ahmedabad) and Mr. Pritesh Meshram (Vikram Sarabhai Space Center, Thiruvananthapuram)].

- **Current Students**

I am currently supervising five projects, including three Master's students (Ms. Sandhya, Mr. Abraham, and Mr. Sameer), Mr. Romeo (IISER Mohali) and one Junior Research Fellow i.e a graduate student (Ms. Surya) at IIST. Additionally, I am mentoring a group of five B.Tech students working on an Astrobiology payload in the Small Spacecraft systems and Payload Centre ([SSPACE](#)) at IIST.

SELECTED ACADEMIC DISTINCTIONS

April 2020	Awarded INSPIRE Faculty Fellowship by the Department of Science and Technology (DST), India (Equivalent of Assistant professor; Independent fellowship for 5 years)
March 2020	Selected for Kavli Fellowship & Boya Fellowship at Kavli Institute for Astronomy and Astrophysics, Peking University, China (unable to join because of Covid travel restrictions)
March 2020	Offered the FONDECYT (The National Fund for Scientific and Technological Development of Chile) Postdoctoral Fellowship 2020 in Chile (declined)
August 2018	IOP publishing award for top-cited Indian author in physics for the IOP Publishing journal portfolio in the three years 2015-2017
July 2013	Awarded a travel grant by the Department of Science and Technology (DST), India to attend a conference 'Galaxies in Absorption' at Paris, France
Oct. 2012	Awarded Junior Research Fellowship (JRF; rank:161/317) and eligibility to lectureship by Council of Scientific and Industrial Research (CSIR) and University Grants Commission (UGC) of India (from the results of the National Eligibility Test held on 17 June 2012)
May 2012	Awarded the eligibility to lectureship (rank:29/191) by CSIR-UGC (from the results of the National Eligibility Test held on 18 December 2011)
Jan. 2009	Late Satish Bhide prize for best project at the Bachelor of Science by Department of Physics, University of Pune

CONFERENCES & TALKS

Invited Conference Talks

- “*Low redshift intergalactic medium: Unraveling Observational Discrepancies and AGN Feedback*” an invited review talk in the conference ‘Reionization in Summer’ at Max Planck Institute of Astronomy, Heidelberg, Germany on June 30, 2023
- “*Star formation history, dust attenuation and EBL*”, invited talk in a special session at 227th AAS meeting, Kissimmee, Florida, 8 January 2016
- “*Low redshift metals and UV background*”, invited talk in the ‘Cloudy Summer School’ at IUCAA, Pune, 25 September 2015

Contributed Conference Talks

- “*Searching for the Imprints of AGN Feedback on the Lyman-alpha Forest*”, in ‘The 39 th Meeting of the Astronomical Society of India (ASI)’ India in February 2021
- “*The low redshift Lyman alpha forest power spectrum*”, in the ‘Wolf Symposium 2018’, Esalen, CA, USA on 2 April, 2018
- “*What Is Ionizing The Intergalactic Medium: QSOs, Galaxies Or Both?*”, at ‘The Dawn of Galaxies 2017’ meeting, Obergurgl University Center, Austria, 16, January 2017
- “*Photon underproduction crisis and redshift evolution of escape fraction*”, 227th AAS meeting, Kissimmee, Florida, 5 January 2016
- “*Extragalactic background light*”, in workshop ‘Galaxies in Absorption’ at Institut d’Astrophysique de Paris, France, 24 September, 2014
- “*Extragalactic background light: Implications on Helium reionization*”, ‘Workshop on Cosmology from Baryons at High Redshift’, ICTP, Trieste, Italy, 20 August, 2014,
- “*Extragalactic UV background*”, ‘The 30th Meeting of the Astronomical Society of India (ASI)’ IISER, Trivandrum, India, 19 February, 2013
- “*He II ionization rate and UV escape from Galaxies*”, ‘The workshop on galaxies in absorption’, IUCAA, Pune, India, 18 December, 2012

Selected Colloquia, Seminars and other Talks

- “*How to probe AGN feedback using intergalactic medium*” Lunch talk at UC Santa Barbara, CA, USA, on October 18, 2023
- “*Low-redshift Intergalactic Medium: Observational Discrepancies and AGN Feedback*” a seminar at IUCAA Pune, India on 31 August 2023

- *“Journey into the Low-Redshift Intergalactic Medium: Unraveling Observational Discrepancies and Galaxy Formation Feedback”* Tea talk at Geneva Observatory, Switzerland on July 4, 2023
- *“How to probe AGN feedback using the intergalactic medium?”* a colloquium at NCRA, Pune, India on 10 March 2023
- *“How to Find Alien Megastructures?”* a seminar at Berkeley SETI Research Center, UC Berkeley on 4 August 2022
- *“Thermal history of the intergalactic medium”* a colloquium at Tuesday Astronomy Meeting, IUCAA, Pune, India, 18 September 2018
- *“Extragalactic background light”*, a Lunch-talk at UC Santa-Barbara, CA, USA, 2 February 2018
- *“Counting photons in the Universe: from extreme UV to far-IR”*, a seminar at ARIES, Nainital, India 27 April 2017
- *“What drives the ionization state of hydrogen in the IGM: galaxies, QSOs or dark matter decay?”*, a seminar at RRI, Bengaluru, India, 1 April 2016
- *“Star formation history, dust correction, and the extragalactic background light”*, a seminar at IIA, Bengaluru, India, 30 March 2016
- *“A new model of extragalactic background radiation from ultraviolet to far-infrared”*, a seminar at IISc, Bengaluru, India, 29 March 2016
- *“What is ionizing the IGM: QSOs, Galaxies or Dark matter decay?”*, a seminar at the University of Pennsylvania, Philadelphia, USA, 15 January 2016
- *“Star formation history and dust attenuation”*, talk in ‘Galaxy Coffee’ session MPIA, Heidelberg, Germany, 02 October 2014
- *“Extragalactic background light: Implications on Helium reionization and propagation of high energy γ -rays”*, Lunch talk at Leiden Observatory, Leiden, Netherlands, 27 September 2014

Public Talks

- *“Counting Photons in the Universe”* in ‘Astro Adda’ Program at Planetarium and Regional Science Centre, Kozhikode, Kerala, India, 16 September 2021
- *“Introduction to Astrophysics and Career Opportunities in Astrophysics”* in K.J. Somaiya College of Arts, Commerce & Science, Kopergaon, India, 20 April 2021
- *“History of the Universe”* a public talk in regional language (Marathi) at IUCAA, Pune, India, 28 February 2015

PROFESSIONAL & PUBLIC SERVICES

- **Served as a referee** for Astrophysical Journal, Monthly Notices of Royal Astronomical Society Journal, Acta Astronautica Journal and Hubble Space Telescope Proposals.
- **Serving as a review editor** on the Editorial Board of Extragalactic Astronomy for Frontiers in Astronomy And Space Sciences Journal.
- **Scientific organizer** of a one day satellite workshop on 'Machine Learning in Astronomy' (1st March 2023) in the 41st meeting of Astronomical Society of India, IIT Indore, India.
- **Science Popularisation:** I have actively engaged in science popularization, giving public talks, organizing astronomy quizzes in both rural and urban areas, mentoring high school students in physics projects during summer vacations, teaching in the workshops for science teachers, contributing to National Science Day events in India (last week of February) through poster presentations, astronomy demos, and serving as a judge for science exhibits.

I have published 27 refereed articles (with > 670 citations; h-index = 14). Of these publications, 9 are first author (> 425 citations) and 6 are the second author papers (> 90 citations).

Source: NASA ADS, February 2024 (Google scholar reports more than 800 total citations.)

LIST OF PUBLICATIONS

[In reverse chronological order]

Submitted/Under review

- (27) SSPACE Astrobiology Payload-1 (SAP-1)
Lokaveer A, et. al including **Vikram Khaire**
Submitted in January 2024 to Special issue of COSPAR on Advances of Space Research
- (26) The Measurements of Thermal and Ionization State of the Intergalactic Medium during the Cosmic Afternoon
Teng Hu, **Vikram Khaire**, Joseph F. Hennawi, Todd Tripp, Jose Oñorbe, Michael Walther, Zarija Lukic
Submitted in November 2023 [[arXiv:2311.17895](https://arxiv.org/abs/2311.17895)]
- (25) Lyman Limit System with O VI in the Circumgalactic Environment of a Pair of Galaxies
Dheerajkumar Khonde, Purvi Udhvani, Anand Narayanan, Sowgat Muzahid, **Vikram Khaire**, Martin Wendt
Under review in ApJ; Submitted in November 2023
- (24) Searching for the Imprints of AGN Feedback on the Lyman Alpha Forest Around Luminous Red Galaxies
Vikram Khaire, Teng Hu, Joseph F. Hennawi, Joseph N. Burchett, Michael Walther, Frederick Davies
Under review in MNRAS [[arXiv:2311.08470](https://arxiv.org/abs/2311.08470)]

Published/Accepted

- (23) The Impact of the WHIM on the IGM Thermal State from the Low- z Lyman- α Forest
Teng Hu, **Vikram Khaire**, Joseph F. Hennawi, Jose Oñorbe, Michael Walther, Zarija Lukic, Frederick Davies
2024, MNRAS, 527, 11338 [[arXiv:2308.14738](https://arxiv.org/abs/2308.14738)]
- (22) Can the Low Redshift Lyman Alpha Forest Constrain AGN Feedback Models?
Vikram Khaire, Teng Hu, Joseph F. Hennawi, Michael Walther, Frederick Davies
2024, MNRAS, 527, 4545 [[arXiv:2306.05466](https://arxiv.org/abs/2306.05466)]
- (21) Measuring the thermal and ionization state of the low- z IGM using likelihood free inference
Teng Hu, **Vikram Khaire**, Joseph F. Hennawi, Michael Walther, Hector Hiss, Justin Alsing, Jose Oñorbe, Zarija Lukic, Frederick Davies
2022, MNRAS, 515, 2188 [[arXiv:2207.07151](https://arxiv.org/abs/2207.07151)]

- (20) How Robust are the Inferred Density and Metallicity of the Circumgalactic Medium?
Anshuman Acharya & **Vikram Khaire**
2022, MNRAS, 509, 5559 [[arXiv:2104.01182](#)]
- (19) Physical conditions of five OVI absorption systems towards PG 1522+101
Sriram Shankar, Anand Narayanan, Blair D Savage, **Vikram Khaire**, Benjamin E Rosenwasser,
Jane C Charlton, Bart P Wakker
2020, MNRAS, 498, 486 [[arXiv:2009.03885](#)]
- (18) Solar Metallicity Gas in the Extended Halo of a Galaxy at $z \sim 0.12$
Jayadev Pradeep, Sriram Shankar, T M Umasree, Anand Narayanan, **Vikram Khaire**, Matthew
Gebhardt, Sameer, Jane C Charlton
2020, MNRAS, 493, 250 [[arXiv:2001.10558](#)]
- (17) Effect of non-equilibrium ionization on derived physical conditions of the high- z intergalactic medium
Prakash Gaikwad, Raghunathan Srianand, **Vikram Khaire**, T. R. Choudhury
2019, MNRAS 490, 1588 [[arXiv:1812.01016](#)]
- (16) The Power Spectrum of the Lyman- α Forest at $z < 0.5$
Vikram Khaire, Michael Walther, Joseph F. Hennawi, Jose Oñorbe, Zarija Lukic, J. Xavier
Prochaska, Todd M. Tripp, Joseph N. Burchett, Christian Rodriguez
2019, MNRAS, 486, 769 [[arXiv:1808.05605](#)]
- (15) C IV Absorbers Tracing Cool Gas in Dense Galaxy Group/Cluster Environments
Aditya Manuwal, Anand Narayanan, Sowgat Muzahid, Jane C. Charlton, **Vikram Khaire**,
Hum Chand
2019, MNRAS, 485, 30 [[arXiv:1903.04119](#)]
- (14) Physical conditions in high- z optically thin C III absorbers: Origin of cloud sizes and associated correlations
Abhisek Mahopatra, Raghunathan Srianand, **Vikram Khaire**, Ananta Pradhan
2019, MNRAS, 484, 5028 [[arXiv:1901.04510](#)]
- (13) New synthesis models of consistent extragalactic background light over cosmic time
Vikram Khaire, Raghunathan Srianand
2019, MNRAS, 484, 4174 [[arXiv:1801.09693](#)]
- (12) Detection of Low Metallicity Warm Plasma in a Galaxy Overdensity Environment at $z \sim 0.2$
Anand Narayanan, Blair Savage, Preetish Mishra, Bart Wakker, **Vikram Khaire**, Yogesh Wadadekar
2018, MNRAS, 475, 3529 [[arXiv:1801.02844](#)]

- (11) Efficient hydrodynamical simulations of the high-redshift intergalactic medium
Prakash Gaikwad, T. R. Choudhury, Raghunathan Srianand, **Vikram Khaire**
2018, MNRAS, 472, 2233, [[arXiv:1705.05374](#)]
- (10) Detection of Two Intervening Ne VIII Absorbers Probing Warm Gas at $z \sim 0.6$
Sachin Pachat, Anand Narayanan, **Vikram Khaire**, Blair Savage, Sowgat Muzahid, Bart Wakker
2017, MNRAS, 471, 792 [[arXiv:1706.04325](#)]
- (9) Constraints on QSO emissivity using H I and He II Lyman- α forest
Vikram Khaire
2017, MNRAS, 471, 255 [[arXiv:1702.03937](#)]
- (8) Volgt profile Parameter Estimation Routine (VIPER): H I photoionization rate at $z < 0.5$
Prakash Gaikwad, Raghunathan Srianand, T. R. Choudhury, **Vikram Khaire**
2017, MNRAS, 467, 3172 [[arXiv:1610.06572](#)]
- (7) Implications of an updated ultraviolet background for the ionization mechanisms of intervening Ne VIII absorbers
Tanvir Hussain, **Vikram Khaire**, Raghunathan Srianand, Sowgat Muzahid, Amit pathak
2017, MNRAS, 466, 3133 [[arXiv:1612.03178](#)]
- (6) Intergalactic Lyman continuum photon budget in the past 5 billion years
Prakash Gaikwad, **Vikram Khaire**, T. R. Choudhury, Raghunathan Srianand
2017, MNRAS, 466, 838 [[arXiv:1605.02738](#)]
- (5) A pair of O VI & broad Ly- α absorbers probing warm gas in a galaxy group at $z \sim 0.4$
Sachin Pachat, Anand Narayanan, Sowgat Muzahid, **Vikram Khaire**, Raghunathan Srianand, Bart P. Wakker, Blair D. Savage
2016, MNRAS, 458, 733 [[arXiv:1601.05418](#)]
- (4) The redshift evolution of escape fraction of hydrogen ionizing photons from galaxies
Vikram Khaire, Raghunathan Srianand, T. R. Choudhury, Prakash Gaikwad
2016, MNRAS, 457, 4051 [[arXiv:1510.04700](#)]
- (3) Photon underproduction crisis: Are QSOs sufficient to resolve it?
Vikram Khaire, Raghunathan Srianand
2015, MNRAS, 451, L30 [[arXiv:1503.07168](#)]
- (2) Star Formation History, Dust Attenuation, and Extragalactic Background Light
Vikram Khaire, Raghunathan Srianand
2015, ApJ, 805, 33 [[arXiv:1405.7038](#)]
- (1) He II optical depth and ultraviolet escape fraction of galaxies
Vikram Khaire, Raghunathan Srianand
2013, MNRAS, 431, L53 [[arXiv:1211.4579](#)]

CONFERENCE PROCEEDING, WHITE PAPERS AND ACCEPTED PROPOSALS

[In reverse chronological order]

- (7) Searching for the Imprints of AGN Feedback on the Ly-alpha Forest Around Massive Quenched Galaxies
Vikram Khaire et al. (2022, HST Proposal Cycle 30)
- (6) CosmoVis: A Unified Framework for Exploring Hydrodynamic Simulation Datasets to Analyze Intergalactic and Circumgalactic Media
Joseph N. Burchett (PI) including **Vikram Khaire** (2019, HST Proposal Cycle 27)
- (5) Ultraviolet Perspectives on Diffuse Gas in the Largest Cosmic Structures
Joseph N. Burchett et al. 2019 including **Vikram Khaire** (white paper for Astro2020: Decadal Survey on Astronomy and Astrophysics)
- (4) Filling the Void: A Comprehensive Survey of the Intergalactic Medium at $z \sim 1$ Using STIS/COS Archival Spectra
Vikram Khaire (2017, HST Proposal Cycle 25)
- (3) Star formation history, dust correction, and the extragalactic background light
Vikram Khaire, Raghunathan Srianand (2016 AAS meeting)
- (2) Photon underproduction crisis and the redshift evolution of escape fraction of hydrogen ionizing photons from galaxies
Vikram Khaire, Raghunathan Srianand (2016 AAS meeting)
- (1) Extragalactic UV background
Vikram Khaire, Raghunathan Srianand (2013 ASI meeting)