Rohan Naidu (he/him)

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Research Interests

first stars & galaxies, cosmic reionization, galaxy formation & evolution;
Galactic archaeology, near-field cosmology, dark matter

Education

Harvard University, U.S.A., Ph.D. in Astronomy 2017–2022
Advisor: Prof. Charlie Conroy
Thesis: *Unraveling the Galactic Halo with the H3 Survey*

Yale-NUS College, Singapore, B.S. in Physical Sciences 2013–2017
magna cum laude, inaugural class of 150 of "Asia's first liberal arts college"
Capstone Advisor: Prof. Pascal Oesch, Capstone: *Insights into Cosmic Reionization*

Professional Appointments

NASA Hubble Fellow, Massachusetts Institute of Technology, U.S.A. 2022–2025

Pappalardo Fellow, Massachusetts Institute of Technology, U.S.A. 2025–2027

Academic Honors

Fireman Prize, Astronomy Department, Harvard University 2022
awarded to a graduating student for "superlative work on their Ph.D. thesis"

Certificate of Distinction in Teaching, Harvard University 2021
for a "special contribution to undergraduate teaching"
based on student evaluations for courses taught during the pandemic

Ashford Fellowship, Harvard University 2017-2022
awarded to six incoming students who are "highly likely to make a substantial impact in their chosen field of study, as well as in society"

Peirce Fellowship, Astronomy Department, Harvard University 2017-2020
awarded to 1-3 incoming graduate students who "possess significant promise as researchers"

Chambliss Astronomy Student Achievement Award, American Astronomical Society 2017

Outstanding Capstone Project in Physical Sciences, Yale-NUS College 2017

Select Observing Programs as Principal Investigator

Total funding from approved *JWST* and *HST* observing programs: $216,000

JWST, NIRCam, WFSS — 7 hours, 2022/23
Where Cosmic Dawn Breaks First:
Mapping the Primordial Overdensity Powering a $z \sim 9$ Ionized Bubble

JWST, NIRCam, WFSS — 18 hours, 2022/23
Anatomy of an Ionized Bubble at $z = 6.6$:
Which Galaxies Reionized the Universe?

Magellan (Baade Telescope), MagE — 8.5 nights, 2022-
To 100 kpc and Beyond:
Bringing the Gaia Revolution to the Brink of the Galaxy

Magellan (Clay Telescope), MIKE — 20 nights, 2021-
Extending the Chemical Reach of the H3 Survey of the Galactic Halo

Magellan (Baade Telescope), FIRE — 10 nights, 2019-20
Rest-UV Spectroscopy of Galaxies Reionizing the Universe at $z = 6 - 7$

Hubble Space Telescope, WFC3/UVIS — 5 orbits, 2018
Confirming Extreme Lyman Continuum Emission in a $z = 3.27$ Star-Forming Galaxy

Magellan (Baade Telescope), IMACS — 4 nights, 2018
A Lyα Survey to Harvest Lyman Continuum and Prepare for JWST

Select Observing Programs as Co-Investigator

PIs: Charlie Conroy, Dennis Zaritsky, MMT, Hectochelle — 200+ nights, 2018-
The H3 Spectroscopic Survey of the Stellar Halo. Core survey team member.

PI: Pascal Oesch, JWST, NIRCam — 53 hours, 2022-23
FRESCO: The First Reionization Epoch Spectroscopic COmplete Survey

PI: Sirio Belli, JWST, NIRSpec — 84 hours, 2022-23
The Stellar and Gas Content of Galaxies at Cosmic Noon

PI: Jorryt Matthee, VLT, FLAMES — 36 hrs, 2022-23
Solving the Lyman Continuum Escape Problem with High-Resolution Lyα

PI: Jorryt Matthee, VLT, X-SHOOTER — 42 hrs, 2022-23
The Luminosity Dependence of the Escape Fraction using Lensed Lyα at $z \approx 3$

PI: Charlotte Mason, MMT, Binospec — 15.5 nights, 2019-21
BLAS: The Binospec Lyα Survey

PI: Sandro Tacchella, MMT, MMIRS — 12 nights, 2019-21
Consensus on low-mass galaxies: how do low-mass galaxies grow?

Publication Record

20 primary author (first/second author) papers, 800+ citations, h-index 14, ADS library.
45 total papers, 1400+ citations, h-index 20, ADS library.
26 papers set in the Milky Way, 19 papers set in the distant Universe.
† marks 4 supervised student papers.

Primary Author Papers

20. †V. Chandra, **R.P. Naidu**, C. Conroy, et al., *Distant Echoes of the Milky Way's Last Major Merger*, arXiv:2212.00806, submitted to ApJ.
19. †K. Sharpe, **R.P. Naidu**, C. Conroy, *What is Missing from the Local Stellar Halo?*, arXiv:2211.04562, submitted to ApJ.
18. **R.P. Naidu**, P. A. Oesch, D. Setton et al., *Schrodinger's Galaxy Candidate: Puzzlingly Luminous at $z \approx 17$, or Dusty/Quenched at $z \approx 5$?*, arXiv:2208.02794, submitted to ApJL.
17. **R.P. Naidu**, C. Conroy, A. Bonaca, et al., *Live Fast, Die α-Enhanced: The Mass-Metallicity-α Relation of the Milky Way's Disrupted Dwarf Galaxies*, arXiv:2204.09057, submitted to ApJ.
16. **R.P. Naidu**, P. A. Oesch, P. G. van Dokkum et al., *Two Remarkably Luminous Galaxy Candidates at $z \approx 10-12$ Revealed by JWST*, ApJL, in press.
15. A. P. Ji, **R.P. Naidu**, K. Brauer et al., *Chemical abundances of the Typhon Stellar Stream*, MNRAS, in press.
14. †J. J. Han, **R.P. Naidu**, C. Conroy et al., *A Tilt in the Dark Matter Halo of the Galaxy*, ApJ, 934, 14, 2022.
13. **R.P. Naidu**, A.P. Ji, C. Conroy, et al., *Evidence from Disrupted Halo Dwarfs that r-process Enrichment via Neutron Star Mergers is Delayed by >500 Myrs*, ApJL, 926, 32, 2022.
12. **R.P. Naidu** & J. Matthee et al., *The Synchrony of Production and Escape: Half the Bright Lyα Emitters at $z \approx 2$ have Lyman Continuum Escape Fractions $\approx 50\%$*, MNRAS, 510, 4582, 2022.
11. J. Matthee & **R.P. Naidu** et al., *(Re)Solving Reionization with Lyα: How Bright Lyα Emitters Account for the $z \approx 2-8$ Cosmic Ionizing Background*, MNRAS, 512, 5960, 2022.
10. **R.P. Naidu**, C. Conroy, A. Bonaca, et al., *Reconstructing the Last Major Merger of the Milky Way with the H3 Survey*, ApJ, 923, 92, 2022.
9. C. Conroy, **R.P. Naidu**, N. Garavito-Camargo, et al., *All-Sky Dynamical Response of the Galactic Halo to the Magellanic clouds*, Nature, 592, 534–536, 2021.
8. †M.T. Gialluca, **R.P. Naidu**, A. Bonaca, *Velocity Dispersion of the GD-1 Stellar Stream*, ApJL, 911, 32, 2021.
7. A. Bonaca, **R.P. Naidu**, C. Conroy, et al., *Orbital Clustering Identifies the Origins of Galactic Stellar Streams*, ApJL, 909, 26, 2021.
6. **R.P. Naidu**, C. Conroy, A. Bonaca, et al., *Evidence from the H3 Survey That the Stellar Halo Is Entirely Comprised of Substructure*, ApJ, 901, 48, 2020.
5. **R.P. Naidu**, S. Tacchella, C.A. Mason, et al., *Rapid Reionization by the Oligarchs: The Case for Massive, UV-bright, Star-forming Galaxies with High Escape Fractions*, ApJ, 892, 109, 2020.

4. C.A. Mason, **R.P. Naidu**, S. Tacchella, J.R. Leja, *Model-independent constraints on the hydrogen-ionizing emissivity at $z > 6$*, MNRAS, 489, 2669, 2019.
3. C. Conroy, **R.P. Naidu**, D. Zaritsky, et al., *Resolving the Metallicity Distribution of the Stellar Halo with the H3 Survey*, ApJ, 887, 237, 2019.
2. **R.P. Naidu**, B. Forrest, P.A. Oesch, et al., *A low Lyman Continuum escape fraction of $< 10\%$ for extreme [OIII] emitters in an overdensity at $z \sim 3.5$*, MNRAS, 478, 791, 2018.
1. **R.P. Naidu**, P.A. Oesch, N. Reddy, et al., *The HDUV Survey: Six Lyman Continuum Emitter Candidates at $z \sim 2$ Revealed by HST UV Imaging*, ApJ, 847, 12, 2017.

Contributing Author Papers

25. R. Bouwens et al., *Evolution of the UV LF from $z \sim 15$ to $z \sim 8$ Using New JWST NIRCam Medium-Band Observations over the HUDF/XDF*, arXiv:2211.02607, submitted to MNRAS.
24. J. Johnson et al., *Dwarf galaxy archaeology from chemical abundances and star formation histories*, arXiv:2210.01816, submitted to MNRAS.
23. L. Barrufet et al., *Unveiling the Nature of Infrared Bright, Optically Dark Galaxies with Early JWST Data*, arXiv:2207.14733, submitted to MNRAS.
22. C. Conroy et al., *Birth of the Galactic Disk Revealed by the H3 Survey*, arXiv:2204.02989, submitted to ApJ.
21. H. Rix et al., *The Poor Old Heart of the Milky Way*, ApJ, in press.
20. V. Chandra et al., *A Ghost in Boötes: The Least Luminous Disrupted Dwarf Galaxy*, ApJ, in press.
19. J. J. Han et al., *The Stellar Halo of the Galaxy is Tilted & Doubly Broken*, AJ, 164, 249, 2022.
18. M. Hasheminia et al., *No Evolution in the Half-mass Radius of Milky Way-type Galaxies over the Last 10 Gyr* , ApJ, 932, 23, 2022.
17. D. Schaerer et al., *First look with JWST spectroscopy: Resemblance among $z \sim 8$ galaxies and local analogs* , A&A, 665, L4, 2022.
16. E. Leonova et al., *The prevalence of galaxy overdensities around UV-luminous Lymanα emitters in the Epoch of Reionization*, MNRAS, 515, 5790, 2022.
15. J. Shen et al., *The Mass of the Milky Way from the H3 Survey*, ApJ, 925, 1S, 2022.
14. Y. Qin et al., *Dark-ages Reionization and Galaxy Formation Simulation XX. The Lyα IGM transmission properties and environment of bright galaxies during the Epoch of Reionization*, MNRAS, 510, 3858, 2022.
13. J. Matthee et al., *The X-SHOOTER Lyman-α survey at $z = 2$ (XLS-z2) I: the panchromatic spectrum of typical Lyman-α emitters*, MNRAS, 505, 1382M, 2021.
12. R. Bouwens et al., *New Determinations of the UV Luminosity Functions from $z \sim 9$ to $z \sim 2$ Show a Remarkable Consistency with Halo Growth and a Constant Star Formation Efficiency*, AJ, 162, 47B, 2021.
11. C. Carter et al., *Ancient Very Metal-poor Stars Associated with the Galactic Disk in the H3 Survey*, ApJ, 908, 208, 2021.
10. D. Zaritsky et al., *Discovery of Magellanic Stellar Debris in the H3 Survey*, ApJL, 905, 3, 2020.
9. B.D. Johnson et al., *A Diffuse Metal-poor Component of the Sagittarius Stream Revealed by the H3 Survey*, ApJ, 900, 103, 2020.

8. A. Bonaca et al., *Timing the Early Assembly of the Milky Way with the H3 Survey*, ApJL, 897, 18, 2020.
7. A. Bonaca et al., *High-resolution Spectroscopy of the GD-1 Stellar Stream Localizes the Perturber near the Orbital Plane of Sagittarius*, ApJL, 892, 37, 2020.
6. D. Zaritsky et al., *A Lower Limit on the Mass of Our Galaxy from the H3 Survey*, ApJ, 888, 114, 2020.
5. C. Conroy et al., *Mapping the Stellar Halo with the H3 Spectroscopic Survey*, ApJ, 883, 107, 2019.
4. X. Fan et al., *The Discovery of a Gravitationally Lensed Quasar at* $z = 6.51$, ApJL, 870, 11, 2019.
3. L.H. Jones et al., $z{\sim}2.5-3$ *Ionizers in the GOODS-N Field*, ApJ, 862, 142, 2018.
2. P.A. Oesch et al., *HDUV: The Hubble Deep UV Legacy Survey*, ApJS, 237, 12, 2018.
1. C. Conroy et al., *They Might Be Giants: An Efficient Color-based Selection of Red Giant Stars*, ApJL, 861, 16, 2018.

Coverage in Popular Media

- On "Two Remarkably Luminous Galaxies at $z \approx 12$ Revealed by JWST"
  - *JWST finds two of the oldest and most distant galaxies ever seen*, The Guardian
  - *JWST may have found the most ancient starlight we've ever seen—and it's only the beginning*, The Atlantic
  - *In a single work week, NASA's JWST broke the record for the oldest galaxy ever observed*, Business Insider
  - *JWST has found the oldest galaxy we have ever seen in the universe*, New Scientist
  - *What the spectacular images of JWST Reveal*, Le Monde
  - *The James Webb Space Telescope Might Have Spotted the Most Distant Galaxy Ever Seen*, Smithsonian Magazine
- On "Schrodinger's Galaxy"
  - *JWST Discovers a Galaxy That Could Break Physics*, 1.5 million views on Secrets of The Universe YouTube channel
  - *JWST catches 'imposter' galaxies red-handed*, CNET
  - *Could This Galaxy Be In Two Different Places? James Webb Telescope Reveals Another Candidate For Distant Galaxy*, Mashable
- On Milky Way work
  - *Our Milky Way Galaxy's Most Recent Major Collision*, SciTech Daily
  - *Astronomers chart ocean of dark matter swirling outside the Milky Way*, Live Science
  - *Dark matter could be powering a galaxy that orbits the Milky Way*, SYFY

Invited Talks

Chicago, *The First Glimpse of the The First Galaxies with JWST*	Colloquium, 2023
MIT, *The First Glimpse of the The First Galaxies with JWST*	Colloquium, 2023
Harvard, *The First Glimpse of the The First Galaxies with JWST*	Colloquium, 2023
Yale, *The First Glimpse of the The First Galaxies with JWST*	Colloquium, 2023
Carnegie, *The First Glimpse of the The First Galaxies with JWST*	Colloquium, 2022
ANU, *The First Glimpse of the The First Galaxies with JWST*	Colloquium, 2022
UMass Amherst, *The First Glimpse of the The First Galaxies with JWST*	Colloquium, 2022
U. of Minnesota, *Unraveling the Galactic Halo with the H3 Survey*	Colloquium, 2020
Tufts, *The First Glimpse of the The First Galaxies with JWST*	Seminar, 2022
MIT, *The First Glimpse of the The First Galaxies with JWST*	Seminar, 2022
Sao Paulo, *The First Glimpse of the The First Galaxies with JWST*	Seminar, 2022
U. of Washington, *The First Glimpse of the The First Galaxies with JWST*	Seminar, 2022
CfA, *(Very) Early Results from JWST*	Seminar, 2022
DAWN, *Solving Reionization with Resolved Lyα*	Seminar, 2022
TIFR, *Solving Reionization with Resolved Lyα*	Seminar, 2022
Max Planck Institute, Heidelberg, *Reconstructing the Last Major Merger*	Seminar, 2021
U. Chicago, *Unraveling the Galactic Halo with the H3 Survey*	Seminar, 2021
UC Santa Cruz, *Unraveling the Galactic Halo with the H3 Survey*	Seminar, 2021
Carnegie, *Unraveling the Galactic Halo with the H3 Survey*	Seminar, 2021
NYU, *Unraveling the Galactic Halo with the H3 Survey*	Seminar, 2021
CfA, *Solving Reionization with Resolved Lyα*	Seminar, 2021
Surrey, *Unraveling the Galactic Halo*	Astrophysics Seminar, 2021
UT Austin, *Solving Reionization with Resolved Lyα*	Extragalactic Seminar, 2021
Cambridge, *Reconstructing the Last Major Merger*	Seminar, 2021
Tufts, *Rapid Reionization by the Oligarchs*	Astronomy seminar, 2021
AIP Potsdam, *Reconstructing the Last Major Merger*	Milky Way seminar, 2021
IAS, Princeton, *Unraveling the Galactic Halo with the H3 Survey*	Astro Coffee, 2020
Flatiron CCA, *Reconstructing the Last Major Merger*	Dynamics meeting, 2020
U. of Arizona, *Unraveling the Galactic Halo with the H3 Survey*	Galaxy Crawl seminar, 2020
Max Planck Institute, Heidelberg, *Unraveling the Galactic Halo*	Galaxy Coffee, 2020
Harvard, *Connecting the Milky Way to High-z Galaxy Evolution*	HiGEM seminar, 2020
U. of Arizona, *Rapid Reionization by the Oligarchs*	EURECA seminar, 2020
ESO Chile, *Rapid Reionization by the Oligarchs*	Thirty Minutes Talk, 2019

Conference Talks

Reionization & Cosmic Dawn, Berkeley *Solving Reionization with Resolved Lyα*	2022
SAZERAC2, *Double Bubble Lyman Trouble: Indirect tracers of LyC for the JWST Era*	2021
Streams21, *The Accretion Origins of Stellar Streams*	2021
AAS Winter Meeting, *Unraveling the Galactic Halo with the H3 Survey*	2021
Harvard-Heidelberg Star-Formation Meeting, *Starburst (Sgrburst) in our Backyard*	2020
SAZERAC, *Rapid Reionization by the Oligarchs*	2020
Early Galaxy Evolution in the ALMA & JWST Era, *Rapid Reionization by the Oligarchs*	2019
Escape of Lyman Radiation, OAC Crete, *LyC at $z \approx 2-3$ with the HDUV Survey*	2018

Teaching & Advising

Teaching

Head Teaching Fellow, *Stellar & Planetary Astronomy*, Harvard University — Spring 2021
Instructor: Prof. John Johnson

Teaching Fellow, *Galaxies & Cosmology*, Harvard University — Fall 2019
Instructor: Prof. Charlie Conroy

Teaching Assistant, *Intro. to Observational Astronomy*, Yale-NUS College — Spring 2017
Instructor: Prof. Bryan Penprase

Advising

Clara Xu (MIT) — 2023-
adviser on ongoing dwarf galaxy simulation project

Katherine Sharpe (Harvard College) — 2021-
advised with Prof. Charlie Conroy on one paper and Harvard Jr. Thesis

Vedant Chandra (Harvard Astronomy) — 2021-
adviser on ongoing outer halo survey; one paper published, several in prep.

Steve Diaz (UMass Lowell, SAO Latino Initiatives Program) — 2021
mentored on all aspects of research life during 3 month internship

Jesse Han (Harvard Astronomy) — 2021
advised with Prof. Charlie Conroy on one paper

Megan Gialluca (Northern Arizona University, SAO REU student) — 2020-21
advised with Dr. Ana Bonaca on one published paper

Lavonna Mark (Yale-NUS College) — 2020-21
advised on PhD applications & interviews, Stanford PhD on prize fellowship

Jerrick Wee (Yale-NUS College) — 2017-18
mentored on all aspects of astronomy research, published two papers

Diversity, Equity, Inclusion

- Survey Representative, Harvard Graduate Student Mental Health Survey (2021)
  - One of five Astronomy Dept. point-persons for the Harvard-wide initiative.
  - Coordinated 95% participation from department and helped disseminate results.
- Python instructor & STEM Mentor, SAO's Latino Initiatives Program (2021)
  - Three month program for students from communities under-represented in STEM.
  - Introduced students to python with a focus on scientific computing.
  - Held weekly one-to-one mentoring meetings.
- Volunteer, Harvard Banneker Institute summer program (2018, 2020)
  - Ten week research-study experience to prepare students of color for graduate school.
  - Held weekly office hours on all aspects of research, provided catch-all programming assistance.
- Department Point-Person & Volunteer, Harvard Graduate Students Union (2017-19)
  - Fair pay, affordable healthcare, and protection from abuse are core goals of the union.
  - Canvassed STEM departments (≈200 calls + in-person conversations) and international students (e.g., Harvard Crimson Op-Ed) for union formation election.
  - Organized action with a focus on international student issues (e.g., Muslim ban, visa-related travel reimbursements, pandemic pay).

Professional Service

- Scientific & Local Organizing Committees, First Light Conference, Boston (2023)
- Journal referee for the Astrophysical Journal (ApJ, ApJL), and Astronomy & Astrophysics (A&A, A&AL)
- Chief Coordinator, Harvard Astronomy's Recruitment Week (2019)
  - One of two grad students in-charge of every aspect of recruitment (e.g., designing the overall program, travel/restaurant arrangements, liaising with faculty/admin).
  - Developed new programming (e.g., closed-door student panel fielding anonymous questions) and conducted an entry/exit survey to understand the visit's successes/failures.
  - Produced a detailed report for faculty identifying areas of weakness (e.g., lacking CfA web portals) that spurred action.

Other Interests

- Quizzing/Trivia/Quiz-bowl
  - Won several national & international events – youngest gold medalist at the Asia-Pacific Quizzing Championships and four-time national champion (Singapore), one-time international champion of the Tata Crucible campus quiz (among the world's largest university tournaments with 38 cities, 5000+ teams).
  - Wrote/presented 1000+ questions for TV shows, pub quizzes, and community events.
- Poetry
  - Published in journals including Helter Skelter Magazine's New Indian Writing, the Quarterly Literary Review Singapore, and Softblow. Shortlisted/longlisted for prizes including the Poetry Society of India's All-India Prize, University of Canberra's International Poetry Prize, and the Wingword Poetry Prize.
- Data-science for social good
  - Led the team behind the viral electoral literacy website, electionaire.info (>500,000 unique hits, > 10% of Singapore's population). Conceptualized the project, recruited team, oversaw research on stances of political parties, handled press.
  - Data miner for studies focused on domestic maids' rights in Singapore. Studies based on these data revealed live-in domestic maids from the Philippines, Indonesia and India who work in 1-of-4 households often enter contracts with zero off days per month.