# Rohan Naidu

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## Research Interests

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

## Education

**Harvard University, U.S.A.**, Ph.D. in Astronomy 2017–2022
Advisor: Prof. Charlie Conroy (expected)
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*

## Academic Honors

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"*

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.*

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

## Publication Record

13 primary author (first/second author) papers, 380+ citations, h-index 9, ADS library.
27 total papers, 650+ citations, h-index 15, ADS library.
15 papers set in the Milky Way, 12 papers set in the distant Universe.
† denotes supervised undergraduate student paper.

### Primary Author Papers

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*, arXiv:2110.14652, submitted to ApJL.

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 $\approx 50\%$*, arXiv:2110.11961, submitted to MNRAS.
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*, arXiv:2110.11967, submitted to MNRAS.
10. **R.P. Naidu**, C. Conroy, A. Bonaca, et al., *Reconstructing the Last Major Merger of the Milky Way with the H3 Survey*, arXiv:2103.03251, ApJ in press.
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, 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

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*, arXiv:2108.03675.
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.
12. R.J. 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.
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.

## Observing Programs as Principal Investigator

James Webb Space Telescope, NIRCam — 7 hours, 2022/23
*Where Cosmic Dawn Breaks First:*
*Mapping the Primordial Overdensity Powering a* $z \sim 9$ *Ionized Bubble*

James Webb Space Telescope, NIRCam — 18 hours, 2022/23
*Anatomy of an Ionized Bubble at* $z = 6.6$*:*
*Which Galaxies Reionized the Universe?*

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 Ly*$\alpha$ *Survey to Harvest Lyman Continuum and Prepare for James Webb*

## Observing Programs as Co-Investigator

PIs: Charlie Conroy, Dennis Zaritsky, MMT, Hectochelle — 150+ nights, 2018-
*The H3 Spectroscopic Survey of the Stellar Halo.* Core survey team member.

PI: Pascal Oesch, James Webb Space Telescope, NIRCam — 53 hours, 2022/23
*FRESCO: The First Reionization Epoch Spectroscopic COmplete Survey*

PI: Sirio Belli, James Webb Space Telescope, NIRSpec — 46+37.5 hours, 2022/23
*The Stellar and Gas Content of Galaxies at Cosmic Noon*

PI: Jorryt Matthee, VLT, FLAMES — 16 hrs, 2021-
*How does the shape of Ly*$\alpha$ *vary among [OIII] emitters at* $z = 3$*?*

PI: Charlotte Mason, MMT, Binospec — 15.5 nights, 2019-21
*Unraveling Reionization with Resolved Lyman Alpha*

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

PI: Pascal Oesch, VLT, X-Shooter — 22 hrs, 2017-18
*Physical Properties of Lyman Continuum Emitter Candidates at* $z \approx 2-3$

## Invited Talks

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| 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* | Lunch Seminar, 2021 |
| Carnegie, *Unraveling the Galactic Halo with the H3 Survey* | Seminar, 2021 |
| NYU, *Unraveling the Galactic Halo with the H3 Survey* | Seminar, 2021 |
| Harvard, *Solving Reionization with Resolved Ly$\alpha$* | Seminar, 2021 |
| Surrey, *Unraveling the Galactic Halo* | Astrophysics Seminar, 2021 |
| UT Austin, *Solving Reionization with Resolved Ly$\alpha$* | 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 |
| U. of Minnesota, *Unraveling the Galactic Halo with the H3 Survey* | Colloquium, 2020 |
| 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

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| 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

### Undergraduate Advising

Katie Sharpe (Harvard Astronomy) — 2021
Junior thesis co-advised with Prof. Charlie Conroy

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

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
advised on all aspects of Astronomy research, published two papers

## Diversity, Equity, Inclusion

- 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 rule changes, pandemic pay).

## Professional Service

- Journal referee for the Astrophysical Journal (ApJ) and Astronomy & Astrophysics (A&A)
- 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.
- 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.

## 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.