

Aneesh Baburaj

(he/him/they)

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EDUCATION

UC San Diego, La Jolla, CA, USA

July 2022 – August 2025

Ph.D., Physics

Thesis: “Two Halves of a Whole: Constraining Planet Formation via High-Resolution Spectroscopy of Host Stars and their Companions”

UC San Diego, La Jolla, CA, USA

September 2019 – June 2022

M.S., Physics

Indian Institute of Science, Bengaluru,
Karnataka, India

August 2015 – May 2019

Bachelor of Science (Research), First Class with Distinction

Major : Physics

RESEARCH EXPERIENCE

Center for Interdisciplinary Research in Astrophysics (CIERA),
Northwestern University

September 2025 – present

Postdoctoral Scholar (w/ Dr. Jason Wang)

- Spectroscopy mode development lead for the Roman Coronagraphic Instrument DRP.
- High-contrast direct spectroscopy with JWST/NIRSpec.

Department of Astronomy & Astrophysics,
UC San Diego

July 2020 – August 2025

Graduate research (Advisor: Dr. Quinn Konopacky)

- Atmospheric characterization of directly imaged companions and their host stars to constrain planet formation pathways.

OBSERVING PROPOSALS & GRANTS

As Principal-Investigator

JWST Cycle 5 GO 10963 - \$146,521

2026–2029

“A Glimpse into Circumbinary Planet Formation at sub-100 au scales with HD 143811 AB b”

XSEDE allocation PHY260112

March 2026 – March 2027

1,500,000 SUs for project *“Atmospheric modeling of the substellar companion HD 206893B with JWST spectra”*

XSEDE allocation PHY250125

May 2025 – May 2026

1,500,000 SUs for project *“Atmospheric Modeling of the exoplanet GJ 504b with JWST spectra”* (Co-PI; PI Konopacky)

JWST Cycle 3 GO 5485 - \$71,185

2024–2027

“How big can you make a planet? Spectroscopic characterization of HD 206893B”

XSEDE allocation PHY230140*August 2023 – December 2025*200,000 SUs for project “*Constraining Directly Imaged Planet Formation using High-Resolution Spectroscopy of Host Stars*”**NASA FINESST Graduate Fellowship - \$100,000***2023–2025***Gemini South/GHOST***2024–2025*

3.6 nights from 2024B–2025B

CTIO/CHIRON*2022–2023*

4.2 nights from 2022A–2023A

Lick Observatory/APF Levy*2022–2024*

7 nights from 2022A–2024B

Co-Investigator**JWST Cycle 4 GO 8063***2025*“*Beyond C/O and metallicity: Can refractory abundances reveal the origin of the largest planets?*” (PI Ruffio)**JWST Cycle 2 GO 3522***2023*“*Spectroscopic characterization of the smallest and coolest directly imaged exoplanet 51 Eridani b*” (PI Ruffio)**CTIO/CHIRON***2021*

1 night in Semester 2021B (PI Konopacky)

Lick Observatory/APF Levy*2021*

1.5 nights from 2021A–2021B (PI Konopacky)

LIST OF PUBLICATIONS

Total number of refereed **first author** papers: 4, Total number of refereed papers: 9

h-index: 5

First-author:

1. **Baburaj, A.**, Konopacky Q., Ruffio, J.-B., et al., “*JWST/NIRSpec Spectroscopy of HD 206893 B reveals a Solar Metallicity Companion*”, in prep
2. **Baburaj, A.**, Konopacky, Q., Theissen, C., et al., “*A High-Resolution Spectroscopic Survey of Directly Imaged Companion Hosts: III. Characterization of the Cold Imaged Planet Hosts AF Lep A and ϵ Indi A*”, 2026, AJ, **172**, 227. doi: <https://doi.org/10.3847/1538-3881/ae9afe>
3. **Baburaj, A.**, Ruffio, J.-B., Perrin, M., et al., “*JWST-TST High Contrast: First Direct Spectroscopy of GJ 504 b reveals Clouds and Possible Metal Enrichment*”, 2026, AJ, **172**, 28. doi: [10.3847/1538-3881/ae6919](https://doi.org/10.3847/1538-3881/ae6919)
4. **Baburaj, A.**, Konopacky, Q., Theissen, C., et al., “*A High-Resolution Spectroscopic Survey of Directly Imaged Companion Hosts: II. Diversity in C/O Ratios among Host Stars*”, 2026, AJ, **171**, 21. doi: [10.3847/1538-3881/ae1a6b](https://doi.org/10.3847/1538-3881/ae1a6b)

5. **Baburaj, A.**, Konopacky, Q., Theissen, C., et al., “*A High-Resolution Spectroscopic Survey of Directly Imaged Companion Hosts: I. Determination of diagnostic stellar abundances for planet formation and composition*”, 2025, *AJ*, **169**, 55. doi: 10.3847/1538-3881/ad8dfc

Co-author:

6. Xuan, J., Balmer, W., Chachan, Y., et al. (including **Baburaj, A.**), “*A Sulfur-Rich Atmosphere for the Young Jupiter Analog AF Lep b Reveals Significant Solid Accretion*”, 2026, *AJ*, **172**, 233. doi: 10.3847/1538-3881/ae9d73.
7. Wang, J. J., Millar-Blanchaer, M. A., Ygouf, M., et al. (including **Baburaj, A.**), “*The Roman Coronagraph Community Participation Program: data reduction pipeline design and implementation*”, 2026, *SPIE Proceedings Volume 14145*. doi: 10.1117/12.3101066
8. Gibbs, A., Ruffio, J-B., Bidot, A., et al. (including **Baburaj, A.**), “*Discovery of an Exterior Third Planet Orbiting β Pictoris*”, 2026, *ApJL*, **1006**, L11. doi: 10.3847/2041-8213/ae801b
9. Xuan, J., Ruffio, J-B., Chachan, Y., et al. (including **Baburaj, A.**), “*The volatile-to-refractory abundances of the HR 8799 planets traced by carbon, oxygen, sulfur, and nitrogen*”, 2026, *ApJ*, **1000**, 27. doi:10.3847/1538-4357/ae448f
10. Madurowicz, A., Ruffio, J.-B., Macintosh, B., et al. (including **Baburaj, A.**), “*Direct Spectroscopy of 51 Eridani b with JWST NIRSpec*”, 2025, *AJ*, **170**, 326. doi: 10.3847/1538-3881/ae1028

SELECTED TEACHING, MENTORING, AND OUTREACH EXPERIENCE

CIERA-REACH Mentor for high-school students	<i>July 2026 – August 2026</i>
Volunteer, CROCS, CIERA	<i>May 2026 – Present</i>
Volunteer, Adler Planetarium, Chicago	<i>October 2025 – Present</i>
UCSD A&A Outreach Committee	<i>September 2024 – August 2025</i>
Undergraduate Research Mentor	<i>June 2024 – January 2025</i>
- Ms. Camila Martinez, UC Santa Cruz (now at The Ohio State University)	
Local Organizing Committee, Cool Stars 22, San Diego, CA	<i>June 2024</i>
Barrio Logan Science & Art EXPO	<i>April 2024</i>
San Diego Festival of Science and Engineering EXPO Day	<i>March 2024</i>
Astronomy on Tap San Diego	<i>February 2024</i>
Teaching assistant (Lower Division Physics)	<i>September 2019 – September 2021</i>

REFERENCES

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- Dr. Quinn Konopacky (UC San Diego): qkonopacky@ucsd.edu
 - Dr. Marshall Perrin (Space Telescope Science Institute): mperrin@stsci.edu
 - Dr. Jason Wang (Northwestern University): jason.wang@northwestern.edu
 - Dr. Christopher Theissen (UC San Diego): ctheissen@ucsd.edu