

Aneesh Baburaj

(he/him/they)

Email: ababuraj@ucsd.edu ◊ Website: aneeshb97.github.io ◊ ORCID: 0000-0003-3708-241X

Research Interests: Exoplanets, Planet formation, High-contrast techniques, High-resolution spectroscopy, Stellar abundances, Protoplanetary disks, Atmospheric composition, Exoplanet demographics, Software Development

EDUCATION

UC San Diego, La Jolla, CA, USA *July 2022 - Present*
Ph.D. in Physics (Expected)

UC San Diego, La Jolla, CA, USA *September 2019 - June 2022*
Masters in Physics GPA: 3.85/4

Indian Institute of Science, Bengaluru,
Karnataka, India *August 2015 - May 2019*
Bachelor of Science (Research) GPA: 7.1/8
Major : Physics

SELECTED RESEARCH EXPERIENCE

Department of Astronomy & Astrophysics,
UC San Diego *July 2020 – present*
Graduate research (Advisor: Dr. Quinn Konopacky)

- Atmospheric characterization of directly imaged companions and their host stars to constrain planet formation pathways.
- Analysis of high-resolution host star spectra from the Levy spectrograph at Lick (Baburaj et al. 2024), and the GHOST spectrograph at Gemini South.
- Analysis of JWST NIRSpec IFU data for GJ 504b (GTO 2778; PI Perrin) and HD 206893B (GO 5485; PI Baburaj) using high contrast spectroscopy techniques.

Raman Research Institute (RRI), Bengaluru, India &
Indian Institute of Science (IISc) *August 2018 – April 2019*
Bachelor's thesis (Primary advisor: Dr. K. S. Dwarakanath, RRI; Co-advisor: Dr. Nirupam Roy, IISc)

Max Planck Institute for Astrophysics, Garching,
Germany *May 2018 – July 2018*
Summer Project (Advisor: Dr. Guinevere Kauffmann)

Department of Physics, Indian Institute of Science *May 2017 – July 2017*
Summer Project (Advisor: Dr. Chanda Jog)

Department of Molecular Reproduction, Development and
Genetics (MRDG), Indian Institute of Science *May 2016 – October 2016*
Project (Advisor: Dr. Deepak Saini)

HONORS & AWARDS

1. Future Investigators in NASA Earth and Space Science and
Technology (FINESST) *2023–2025*
2. UC San Diego Physics Chairs Challenge Travel Award *2025*

- | | |
|---|------------------|
| 3. Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship | <i>2015–2019</i> |
| 4. National Talent Search (NTS) fellowship | <i>2013–2015</i> |

OBSERVING PROPOSALS & GRANTS

As Program PI

- | | |
|--|----------------------------------|
| JWST Cycle 3 GO 5485 | <i>2024</i> |
| “How big can you make a planet? Spectroscopic characterization of HD 206893B” | |
| XSEDE Renewal allocation PHY230140 | <i>August 2024 – August 2025</i> |
| 100,000 SUs for project “Constraining Directly Imaged Planet Formation using High-Resolution Spectroscopy of Host Stars” | |
| XSEDE Startup allocation PHY230140 | <i>August 2023 – August 2024</i> |
| 100,000 SUs for project “Constraining Directly Imaged Planet Formation using High-Resolution Spectroscopy of Host Stars” | |
| FINESST Graduate Fellowship | <i>2023 – 2025</i> |
| Gemini South/GHOST | <i>2024</i> |
| 1.47 nights in Semester 2024B | |
| CTIO/CHIRON | <i>2022–2023</i> |
| 4.22 nights from 2022A and 2023A | |
| Lick Observatory/APF Levy | <i>2022–2024</i> |
| 7 nights from 2022A to 2024B | |

As Program Co-I

- | | |
|---|-------------|
| JWST Cycle 2 GO 3522 | <i>2023</i> |
| “Spectroscopic characterization of the smallest and coolest directly imaged exoplanet 51 Eridani b” (PI Ruffio) | |
| CTIO/CHIRON | <i>2021</i> |
| 1 night in Semester 2021B (PI Konopacky) | |
| Lick Observatory/APF Levy | <i>2021</i> |
| 1.5 nights from 2021A and 2021B (PI Konopacky) | |

SELECTED PUBLICATIONS

Peer-reviewed:

- Baburaj, A.**, Konopacky, Q., Theissen, C., Peacock, S., Huseby, L., Fulton, B., Gerasimov, R., Barman, T., Hoch, K., 2024, “A High-Resolution Spectroscopic Survey of Directly Imaged Companion Hosts: I. Determination of diagnostic stellar abundances for planet formation and composition”, *AJ*, in press, arXiv e-prints, arXiv:2409.14239

Non-peer-reviewed & Conference Proceedings:

- Baburaj, A.**, Konopacky, Q., Barman, T., Crossfield, I; Hoch, K., Ruffio, J.-B., Sappéy, B., Theissen, C., 2023, “How big can you make a planet? Spectroscopic characterization of HD 206893B”, *JWST Proposal. Cycle 3, 5485*
- Baburaj, A.**, Konopacky, Q., Theissen, C., Peacock, S., Huseby, L., Gerasimov, R., Barman, T., Hoch, K., 2024, “Constraining Formation of Directly Imaged Planets through High-Resolution

Spectroscopy of Host Stars”, Extreme Solar Systems V, id. 626.02. Bulletin of the American Astronomical Society, Vol. 56, No. 4

SELECTED TALKS

- “*Two Halves of a Whole: Constraining Planet Formation via High-Resolution Spectroscopy of Host Stars and their Companions*” Invited Talk. Northwestern/CIERA Observational Group, Evanston, IL, October 24
- “*Constraining Directly Imaged Planet Formation using High Resolution Spectroscopy of Host Stars*” Talk. STScI Spring Symposium, Baltimore, MD, May 23
- “*High Resolution Spectroscopy of Directly Imaged Planet Hosts*” Invited Talk. STScI Exoplanets and High Contrast Imaging Group, Baltimore, MD, June 22

PROGRAMMING LANGUAGES AND SKILLS

- Proficient: **Python, MATLAB, Linux, HTML**
- Beginner: **IDL, C/C++**
- Wet Lab Skills: **Microbial Culture, Gel Electrophoresis, Polymerase Chain Reaction**

TEACHING, MENTORING, AND OUTREACH EXPERIENCE

Astronomy & Astrophysics Outreach Committee	<i>September 2024 – Present</i>
UCSD Cosmic Tours	<i>September 2024 – Present</i>
Undergraduate Research Mentor - Ms. Camila Martinez, UC Santa Cruz	<i>June 2024 – Present</i>
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>

OTHER WORKSHOPS AND CONFERENCES

Cool Stars 22, San Diego, CA	<i>June 24–28, 2024</i>
Protostars and Planets VII, Kyoto, Japan	<i>April 10–15, 2023</i>
AAS 241, Seattle, WA	<i>January 8–12, 2023</i>
Keck Science Meeting, Pasadena, CA	<i>September 15–16, 2022</i>
Cool Stars 21, Toulouse, France	<i>July 4–9, 2022</i>
Spirit of Lyot 2022, Leiden, Netherlands	<i>June 27–July 1, 2022</i>
Keck Science Meeting, San Diego, CA	<i>September 9–10, 2021</i>
2021 Sagan Exoplanet Summer Virtual Workshop	<i>July 19–23, 2021</i>

REFERENCES

- Dr. Quinn Konopacky (UC San Diego): qkonopacky@ucsd.edu
- Dr. Christopher Theissen (UC San Diego): ctheissen@ucsd.edu
- Dr. Marshall Perrin (Space Telescope Science Institute): mperrin@stsci.edu