

NICOLE ARULANANTHAM

Postdoctoral Fellow

Space Telescope Science Institute (STScI)

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EDUCATION

- **University of Colorado Boulder (CU Boulder)**
PhD, Astrophysical & Planetary Sciences *Received May 2020*
MS, Astrophysical & Planetary Sciences *Received Dec. 2017*
- **Wesleyan University**
MA, Astronomy w/ concentration in Planetary Science *Received May 2015*
- **University of California, Los Angeles (UCLA)**
BS, Astrophysics *Received Jun. 2013*

ACADEMIC POSITIONS

- **JWST Star & Planet Formation Postdoc (STScI)** Sep. 2023-present
Supervisors: Dr. Klaus Pontoppidan, Dr. Joel Green
Project Description: Analyzing Cycle 1 *JWST* MIRI and NIRSpec observations of protoplanetary disks, to characterize warm gas at radii where most planets are expected to form
- **Giacconi Fellow (STScI)** Sep. 2020 - Sep. 2023
Project Description: Analyzing UV/IR/sub-mm data, to explore how UV radiation from T Tauri stars regulates the thermal structure and composition of molecular gas in protoplanetary disks; this work made use of the Hubble Ultraviolet Legacy Library of Young Stars as Essential Standards (ULLYSES) Director's Discretionary Program
- **Graduate Research Assistant** May 2016 - May 2020
Advisor: Dr. Kevin France (CU Boulder)
Dissertation Title: UV Photochemistry and Gas Distributions in Protoplanetary Disks
- **Graduate Research Assistant** Sep. 2013 - Aug. 2015
Advisor: Dr. William Herbst (Wesleyan University)
Thesis Title: Examining the Near-Infrared Properties of KH 15D with *Spitzer* Photometry and GNIRS Spectra
- **Undergraduate Research Assistant** June 2012 - June 2013
Advisor: Dr. Ben Zuckerman (UCLA)
Project Description: Undergraduate thesis on young stellar object classification

AWARDS

- **Giacconi Fellowship (STScI)** Sep. 2020 - Sep. 2023
Awarded \$48,000 over three years for research expenses
- **NASA Earth & Space Science Fellowship (8/141 awarded)** Sep. 2017 - May 2020
Astrophysics Division; Awarded \$135,000 over three years for salary, tuition, and research expenses
- **CU Boulder United Government of Graduate Students Top TA Award** May 2016
- **Chambliss Astronomy Achievement Award (Graduate Student Medalist)** Jun. 2014
- **UCLA Physics & Astronomy Departmental Honors** Jun. 2013

OBSERVING PROPOSALS & GRANTS

Hubble Space Telescope

- **Outflows and Disks around Young Stars: Synergies for the Exploration of ULLYSES Spectra (ODYSSEUS) (co-I)**
Cycle 28 (May 2020); PIs: Herczeg, G., Espaillat, C.; PID #16129
- **A SNAP UV Spectroscopic Study of Star-Planet Interactions (co-I)**
Cycle 24 (June 2016); PI: France, K.; PID #14633
- **Connecting the shape of the FUV spectrum with disk morphology: a combined *HST* and ALMA study of young stellar objects in Lupus (co-I)**
Cycle 24 (June 2016); PI: Manara, C.F.; PID #14604

ESO Telescopes

- **PENELLOPE: the ESO data legacy program to complete the Hubble UV Legacy Library of Young Stars (ULLYSES) (co-I)**
P106 (March 2020); PI: Manara, C.F.; PID #106.20Z8
- **Determining the origin of dipper disk behavior with multi-epoch X-Shooter spectra (co-I)**
P105 (September 2019); PI: Manara, C.F.; PID #105.206N

PROFESSIONAL SERVICE

- **Co-Chair of STScI Spring Symposium 2023** May 2023
Worked with Dr. Isa Rebullido and Dr. Leonardo dos Santos to organize in-person symposium for 150 participants, titled “Planetary Systems and the Origins of Life in the era of JWST”
- **Journal Referee (Astronomy & Astrophysics)** 2022-present
- **Co-Lead of STScI Star & Planet Formation Group** 2021-present
Coordinates bi-weekly meetings, proposal hack sessions, and other events for 15-20 researchers investigating star and planet formation.
- **Panel Support for *HST* and *JWST* Time Allocation Committees** 2021-present
*Served as a panel support scientist for *JWST* (Cycle 1) and *HST* (Cycle 29), and as a leveler for *HST* (Cycle 30); scheduled to serve as a panel support scientist for *JWST* Cycle 3 (January 2024)*
- **Subject Matter Expert Reviewer** 2021-2023
Subject matter expert reviewer in NASA and NSF peer review panels
- **CU Boulder APS Committees** 2015-2020
Assembled department newsletter
Vetted questions for comprehensive exam, to be taken by second and third year graduate students
Helped develop uniform procedure for hiring tenure track faculty (worked with university HR, current APS faculty, and other graduate students)

INVITED TALKS & COLLOQUIA

- *Assembling a Picture of Planet Formation in the Era of HST and JWST*
University of Illinois Astronomy Colloquium Nov. 2023
- *Modeling UV-Driven Chemistry in Protoplanetary Disks with Constraints from HST’s ULLYSES Program*
Five Colleges Astronomy Department Colloquium March 2023

- *UV-driven Evolution and Chemistry of Protoplanetary Disks: Insights from HST's ULLYSES Program*
Carnegie EPL Astro Seminar Feb. 2023
- *Ly α Scattering in T Tauri Systems: Insights from HST's ULLYSES Program*
MPA SESTAS Meeting Dec. 2022
- *Modeling UV-Driven Chemistry in Protoplanetary Disks with Constraints from HST's ULLYSES Program*
ESO/MPE Star & Planet Formation Seminar Dec. 2022
- *Ly α Scattering in T Tauri Systems: Insights from HST's ULLYSES Program*
AAS Meeting #240 June 2022
- *UV Photochemistry and Gas Distributions in Protoplanetary Disks*
Wesleyan University Colloquium Jan. 2020
- *Searching for Signatures of Star-Planet Interactions with HST*
CfA Exoplanet Pizza Lunch Jan. 2020
- *Tracing UV-sensitive molecules in protoplanetary disks with HST*
CfA Stars & Planets Seminar Jan. 2020
- *Tracing Inner Disk H₂ and CO in Protoplanetary Systems with HST-COS*
AAS Meeting #233, NESSF Special Session Jan. 2019

CONFERENCE CONTRIBUTIONS

- *MIRI maps a molecular disk wind, CO, and water in an edge-on protoplanetary disk*
The First Year of JWST Science Conference Sep. 2023
- *UV-driven Evolution and Chemistry of Protoplanetary Disks: Insights from HST's ULLYSES Program*
The Inner Disk of Young Stars: Accretion, Ejection, and Planet Formation Conference May 2023
- *UV-driven Evolution and Chemistry of Protoplanetary Disks: Insights from HST's ULLYSES Program* (poster)
Protostars & Planets VII April 2023
- *UV-driven Evolution and Chemistry of Protoplanetary Disks: Insights from HST's ULLYSES Program* (iPoster)
AAS Meeting #241 Jan. 2023
- *UV-driven Evolution and Chemistry of Protoplanetary Disks: Insights from HST's ULLYSES Program*
Disks and Planets Across ESO Facilities Conference Nov. 2022
- *Ly α Scattering in T Tauri Systems: Insights from HST's ULLYSES Program* (poster)
Cool Stars 21 July 2022
- *UV Fluorescence Traces Gas and Ly α Evolution in Protoplanetary Disks* (contributed talk, virtual)
Stars and Planets in the Ultraviolet: A Cross-Community Symposium May 2021
- *Constraining gas disk structure in MY Lupi with submillimeter and UV models* (poster, virtual)
Five Years After HL Tau: A New Era in Planet Formation Dec. 2020
- *Connecting HST and ALMA Observations of Molecular Gas in Protoplanetary Disks*
Gordon Research Seminar: Origins of Solar Systems Jun. 2019
- *Connecting HST and ALMA Observations of Molecular Gas in Protoplanetary Disks* (poster)
Gordon Research Conference: Origins of Solar Systems Jun. 2019

- *Tracing Inner Disk H₂ and CO in Protoplanetary Systems with HST-COS* (poster)
AAS Meeting #233 Jan. 2019
- *Mapping the Inner Disk Gas around Young Stars in the Lupus Complex*
Take a Closer Look: The innermost region of protoplanetary discs and its connection to the origin of planets Oct. 2018
- *A Study of Inner Disk Gas around Young Stars in the Lupus Complex* (poster)
IAU Symposium 345 - Origins: From the Protosun to the First Steps of Life Aug. 2018
- *A HST Catalog of UV Activity Levels in Planet-Hosting and Non-Planet Hosting Stars* (poster)
Cool Stars 20 Aug. 2018
- *A Study of Inner Disk Gas around Young Stars in the Lupus Complex* (poster)
AAS Meeting #232 Jun. 2018
- *A Panchromatic Study of Molecular Gas in the Protoplanetary System RY Lupi* (poster)
AAS Meeting #231 Jan. 2018
- *Panchromatic Observations of Molecular Gas in the Transitional Disk System RY Lupi* (poster)
Gordon Research Conference: Origins of Solar Systems Jun. 2017
- *Infrared Photometry and Spectroscopy of V582 Mon (KH15D)* (poster)
AAS Meeting #225 Jan. 2015
- *Spitzer Observations of the Eclipsing T Tauri System KH15D* (poster)
AAS Meeting #224 Jun. 2014

TEACHING & MENTORING

- **Teaching Assistant**, CU Boulder
 - ASTR2020: Introduction to Space Astronomy (non-majors) Fall 2018
 - ASTR1000: The Solar System (non-majors) Spring 2016
 - ASTR1010: Introductory Astronomy (non-majors) Fall 2015
- **Teaching Assistant**, Wesleyan University
 - ASTR105: Descriptive Astronomy (non-majors) Fall 2013, Spring 2015
 - ASTR111: Dark Side of the Universe (non-majors) Fall 2014
 - ASTR211: Observational Astronomy (prospective majors) Spring 2014
- **STScI Space Astronomy Summer Program**, Research Mentor June-Aug. 2021, 2022
Supervised undergraduate students; projects used machine learning to identify planet-forming “dipper” disks in light curves from the TESS archive (2021) and ULLYSES data to model the amount of Ly α flux available to photodissociate volatile-bearing molecules in protoplanetary disks (2022; publication in prep)
Program URL: <https://www.stsci.edu/opportunities/space-astronomy-summer-program>
- **STScI Postdoc Peer Mentoring Pods**, Founding Member Feb. 2022-present
Organized small groups (“pods”) of postdocs at STScI, to create space for discussing topics like improving scientific productivity, settling in at STScI, etc.
- **APS Peer Mentoring Program**, Founding Member May 2018 - May 2020
Responsibilities include coordinating mentoring groups, organizing professional development/self-care workshops for APS graduate students and postdocs, recruiting new members
Program was based on a framework designed by Dra. Nicole Cabrera Salazar, with her permission

- **CU Prime Physics Department Mentor** Sep. 2018 - May 2019
Served as a mentor for three undergraduate students in the CU Boulder Physics Department
- **Undergraduate Research Mentor** May-Sep. 2018
CU Boulder
Supervised project on spectroscopy of molecular gas in circumstellar disks
- Wesleyan University May-Aug. 2015
Transferred data reduction pipeline, assisted with YSO light curve analysis
- **Graduate Peer Mentor** Sep. 2016 - May 2018
Served as a mentor for two first year graduate students at CU Boulder

OUTREACH & MEDIA ATTENTION

- **Career Chat at Towson University** Sep. 2022
Met with a group of undergraduate women in STEM majors, to talk about how to build a career in astrophysics
- **Panelist for Press Event with Ethnic Media Services (virtual)** Sep. 2022
Spoke to a group of ~60 journalists about using data from HST and JWST to study star and planet formation
- **Skype a Scientist (virtual)** Feb. 2018 - present
Connect with K-12 classrooms across the country to answer questions about astronomy and becoming a scientist
- **STScI Public Lecture Series (virtual)** Sep. 2021
Gave lecture on “Astronomy vs. Astrology: What’s the Difference, Really?”; presentation live-streamed on YouTube (5.3K views as of Sep. 2022)
- **STScI Youth in Astronomy & Engineering Virtual Family STEM Forum** Feb. 2021, May 2022
Gave live-streamed WebEx presentations on “How to Make a New Planet in a Few Million Years” and “From Sunburns To Planet Formation: Why Is Ultraviolet Starlight So Important?”
- **CU Boulder Public Observing Nights & Astronomy Day** Aug. 2015 - Dec. 2019
Operated telescopes and astronomy demos for the public
- **Gemini e-Newscast #90** Dec. 2016
Press release on Arulanantham et al. (2016), presenting tentative detection of thermal emission from a putative protoplanet
- **Above & Beyond: Cosmic Conversations** Apr. 2016
Public planetarium show on the science behind popular sci-fi movies
- **Wesleyan University Kids’ Nights** Mar. 2015 - Aug. 2015
Assisted with astronomy-related demos, for ages K-12
- **Astronomical Society of Greater Hartford, Invited Talk** Jan. 2015
Presented masters thesis project on KH 15D to a group of amateur astronomers
- **Wesleyan University Public Observing Nights** Sep. 2013 - May 2015
Operated telescopes for public viewings
- **UCLA Physics & Astronomy Academic Affairs Committee** Sep. 2011 - Jun. 2012
Served as a student representative

PROFESSIONAL TRAINING

- Working with Astronomy Data in Python (STScI) April 2022
- Introductory Git Workshop (STScI) Feb. 2022
- 5 Choices to Extraordinary Productivity (STScI) May 2021
- Cultivating Inclusive Leadership (CU Boulder) July 2018
- Own Your Voice: An Assertive Communication Workshop (CU Boulder) June 2018
- LGBTQ Inclusion Safe Zone Training (CU Boulder) Aug. 2017

OTHER PROFESSIONAL & VOLUNTEER EXPERIENCE

- **Maryland Food Bank Volunteer** March 2021 - present
Front desk/office tasks (answer phones/assist visitors/prepare mailings/assemble volunteer schedules/train new volunteers; 2-6 hours per week)
Served 1 year term on Volunteer Leadership Council
Assembled cookbook for FoodWorks training program
- **Boulder Shelter for the Homeless** July 2018 - July 2020
Volunteered to help prepare breakfast for ~100-150 shelter residents (2 hours per week)
- **UCLA Young Research Library** Feb. 2010 - June 2013
Student supervisor in Interlibrary Loans; responsible for internal fund management (19-40 hours per week)

REFEREED PUBLICATIONS (244 TOTAL CITATIONS, H-INDEX=8)

1. *Breaking the Degeneracy Between UV Irradiation and Flaring in Protoplanetary Gas Disks*
Arulanantham, N., Miotello, A., van Terwisga, S., et al., under review
2. *JWST-MIRI MRS Images Disk Winds, Water, and CO in an Edge-On Protoplanetary Disk*
Arulanantham, N., McClure, M.K., Pontoppidan, K., et al., under review
3. *Ly α Scattering Models Trace Accretion and Outflow Kinematics in T Tauri Systems*
Arulanantham, N., Gronke, M., Fiorellino, E. et al., *ApJ*, 944:2, 185
4. *UV Fluorescence Traces Gas and Ly α Evolution in Protoplanetary Disks*
Arulanantham, N., France, K., Hoadley, K., Schneider, P.C., Espaillat, C.C., Günther, H.M., Herczeg, G.J., Brown, A. *AJ*, 162:5, 185, 2021
5. *Probing UV Photochemical Pathways for CN & HCN Formation in Protoplanetary Disks with the Hubble Space Telescope*
Arulanantham, N., France, K., Cazzoletti, P., Miotello, A., Manara, C.F., Schneider, P.C., Hoadley, K. *AJ*, 159, 4, 2020
6. *A UV-to-NIR Study of Molecular Gas in the Dust Cavity around RY Lupi*
Arulanantham, N., France, K., Hoadley, K., Manara, C.F., Schneider, P.C., Alcalá, J.M., Banzatti, A., Günther, H.M., Miotello, A., van der Marel, N., van Dishoeck, E.F., Walsh, C., Williams, J.P. *ApJ*, 855, 98, 2018
7. *Untangling the Near-IR Spectral Features in the Protoplanetary Environment of KH 15D*
Arulanantham, N., Herbst, W., Gilmore, M.S., Cauley, P.W., Leggett, S.K. *ApJ*, 834, 119, 2017
8. *Seeing Through the Ring: Near-infrared Photometry of V582 Mon (KH 15D)*
Arulanantham, N., Herbst, W., Cody, A.M., Stauffer, J.R., Rebull, L.M., Agol, E., Windemuth, D., Marengo, M., Winn, J.N., Hamilton, C.M., Mundt, R., Johns-Krull, C.M., Gutermuth, R.A., *AJ*, 151, 90, 2016

9. *First Detection and Modeling of Spatially Resolved Ly α in TW Hya* Chang, S.-J., **Arulanantham, N.**, Gronke, M., Herczeg, G.J., Bergin, E.A., under review
10. *Water-Rich Disks around Late M-stars Unveiled: Exploring the Remarkable Case of Sz 114* Chengyan, X., Pascucci, I., Long, F., et al., **including Arulanantham, N.**, under review
11. *X-ray, Near-Ultraviolet, and Optical Flares Produced By Colliding Magnetospheres in the Young, High-Eccentricity Binary DQ Tau* Getman, K. V., Kspla, A., **Arulanantham, N.**, et al., accepted for publication in *ApJ* (Oct. 2023)
12. *Twenty-five Years of Accretion onto the Classical T Tauri Star TW Hya* Herczeg, G.J., Chen, Y., Donati, J.-F., et al., **including Arulanantham, N.**, *ApJ*, 956, 2, 2023
13. *The Radial Distribution and Excitation of H₂ around Young Stars in the HST-ULLYSES Survey* France, K., **Arulanantham, N.**, Maloney, E., et al., *AJ*, 166, 2, 2023
14. *Flares, Rotation, Activity Cycles, and a Magnetic Star-Planet Interaction Hypothesis for the Far Ultraviolet Emission of GJ 436* Loyd, R.O.P., Schneider, P.C., Jackman, J.A.G., France, K., Shkolnik, E., **Arulanantham, N.**, Cauley, P.W., Llama, J., & Schneider, A.C., *AJ*, 165, 4, 2023
15. *Towards a comprehensive view of accretion, inner disks, and extinction in classical T Tauri stars: an ODYSSEUS study of the Orion OB1b association* Pittman, C.V., Espaillat, C.C., Robinson, C.E., et al. **including Arulanantham, N.**, *AJ*, 164, 5, 2022
16. *The Young Binary DQ Tau Produces Another X-Ray Flare Near Periastron* Getman, K.V., Akimkin, V.V., **Arulanantham, N.**, Kóspál, Á., Semenov, D.A., Smirnov-Pinchukov, G.V., van Terwisga, S.E., *RNAAS*, 6, 3, 2022
17. *The ODYSSEUS Survey. Motivation and First Results: Accretion, Ejection, and Disk Irradiation of CVSO 109* Espaillat, C.C., Herczeg, G.J., Thanathibodee, T., et al. **including Arulanantham, N.**, *AJ*, 163, 3, 114, 2022
18. *PENELLOPE: The ESO data legacy program to complement the Hubble UV Legacy Library of Young Stars (ULLYSES) I. Survey presentation and accretion properties of Orion OB1 and σ -Orionis* Manara, C.F., Frasca, A., Venuti, L., et al. **including Arulanantham, N.** *A&A*, 650, A196, 2021
19. *Estimating the Ultraviolet Emission of M Dwarfs with Exoplanets from Ca II and H α* Melbourne, K., Youngblood, A., France, K., et al. **including Arulanantham, N.** *AJ*, 160, 6:269, 2020
20. *HST Spectra Reveal Accretion in MY Lupi* Alcalá, J.M., Manara, C.F., France, K., Schneider, C.P., **Arulanantham, N.**, Miotello, A., Günther, H.M., Brown, A. *A&A*, 629, id.A108, 2019
21. *Far-ultraviolet Activity Levels of F, G, K, and M Dwarf Exoplanet Host Stars* France, K., **Arulanantham, N.**, Fossati, L., Lanza, A.F., Loyd, R.O.P., Redfield, S., Schneider, P.C. *ApJS*, 239, 16, 2018
22. *Signatures of Hot Molecular Hydrogen Absorption from Protoplanetary Disks I.* Hoadley, K., France, K., **Arulanantham, N.**, Loyd, R.O.P., Kruczek, N. *ApJ*, 846, 6, 2017