

Quick Profile

Determined researcher with 9+ years of astrophysics experience specializing in protoplanetary disks, protostellar outflows, and large-scale data analysis. Expertise in spectroscopy, radiative transfer, 3D simulations, and spectral synthesis. Skilled in Python, Fortran, C++, and HPC workflows with extensive experience analyzing JWST and ALMA datasets. Strong communicator with a proven record of leadership, mentoring, publications, and presentations.

Education

- **Ph.D. in Astronomy**, University of Virginia, Charlottesville, VA Expected April 2026
- **M.S. in Astronomy**, University of Virginia, Charlottesville, VA 2020–2022
GPA: 3.99/4.00
- **B.S. in Astrophysics & Physics; B.A. in Mathematics**, University of Cincinnati, Cincinnati, OH 2016–2020
GPA: 3.77/4.00

Academic Honors: Sigma Pi Sigma (Physics Honor Society, 2019); Phi Beta Kappa (National Honor Society, 2020); Magma Cum Laude | Distinguished University Honors Scholar (University of Cincinnati, 2020)

Research Experience

Graduate Research Assistant (Advisor: Zhi-Yun Li)

2020–Present

University of Virginia
Charlottesville, VA

- Developed custom analysis frameworks for JWST/MIRI and NIRSpec IFU and ALMA data cubes, including calibration, spatial alignment, moment map generation, and spectral diagnostics.
- Performed analysis of H₂ line emission lines to build excitation diagrams and apply extinction corrections, constraining physical conditions in protostellar outflows, and inferring cosmic ray ionization rates.
- Applied spectral synthesis codes to model forbidden [Fe II] fine-structure emission, linking observed line ratios to density, temperature, and extinction.
- Conducted global 3D hydrodynamic + dust simulations of planetary growth via pebble accretion using highly parallel astrophysical frameworks on High Performance Computing (HPC) systems.
- Awarded highly competitive telescope time based on my coordinated of multi-institution observing proposals (JWST Cycles 4; ALMA Cycle 10) and PI/Co-PI of ongoing JWST Cycle 5 proposals
- Invited speaker at STScI (2025), UC (2025), Virginia Tech (2025), contributed presentations to additional international conferences and workshops.

Undergraduate Research Assistant (Advisor: Mike Sitko)

2016–2020

University of Cincinnati
Cincinnati, OH

- Investigated protoplanetary disk structure with a focus on photometric/spectroscopic variability and radiative transfer models of young stellar systems (pre-main-sequence T Tauri and Herbig Ae/Be protostars+disks.)
- Presented research at two American Astronomical Society and twice won best undergraduate presentation in annual physics departmental symposia.
- Ongoing collaboration in studies of pre-main sequence variability such as in photometric “dippers,” hydrogen recombination calibration in Herbig Ae/Be and T Tauri accreting systems, and the star-disk interfaces.

Computational Experience

- 7+ years of experience in Python, Fortran, and Mathematica, with proficiency in IDL, C++, MATLAB, HTML, and Java. Comfortable adapting quickly to new programming languages as needed.
- Experienced in computationally intensive astrophysics simulations, including (i) 3D Monte Carlo radiative transfer modeling of spectral energy distributions; (ii) 3D hydrodynamic + dust simulations of planet formation; (iii) spectral synthesis modeling of forbidden, atomic fine-structure and molecular line emission (e.g., [Fe II], H₂)
- Advanced in Python-based data analysis and visualization of large datasets, including N-dimensional datacubes from JWST and ALMA observations as well as simulations.
- 4+ years of experience with high-performance computing environments, including NASA supercomputing clusters and institutional HPC systems at the University of Cincinnati and University of Virginia.
- NASA GPU Hackathon: Collaborated with scientists and NVIDIA mentors to GPU-accelerate a hydrodynamic + dust code using OpenACC, achieving $\sim 140\times$ speedup over a single CPU and $\sim 20\times$ over MPI-parallel runs via optimized data transfer and GPU offloading (Sep 12–28, 2022)
- Experienced in Git version control using GitHub and Bitbucket: <https://github.com/KorashAssani>

Teaching & Mentorship

- UVA Center for Teaching Excellence: *Tomorrow's Professor Today* (2025–Present); *Teaching as a Graduate Student* (2021). Professional development programs with workshops and events focused on effective teaching and faculty preparation.
- Graduate Teaching Assistant, University of Virginia Astronomy Dept. (2020, 2022).
- Undergraduate Mentor, UVA Astronomy Mentoring Program (2021–2022).
- Peer Leader / Peer Tutor / Supplemental Instructor / Learning Assistant, University of Cincinnati (2017–2019)
- Teaching Assistant, University of Cincinnati Physics Dept. (Fall 2017)
- [News Highlight: UC triple major seeks to inspire and educate](#) (Jan 2019)

Leadership Roles

- Coordinator, UVA Astro Grad Lunch (2023–2024)
- Coordinator, UVA Astronomy Graduate Journal Club (2021–2023)
- Vice President, Society of Physics Students, University of Cincinnati (2018–2020)
- President / Vice President / Treasurer, UC College of Arts & Sciences Student Ambassadors (2016–2020)
- Head of Recruitment, Circle K International (international collegiate service organization, Kiwanis-affiliated) (2016–2018)

Service & Outreach

- Judge, Virginia Piedmont Regional Science Fair (2023, 2025)
- Coordinator, UVA Astro Grad Lunch (2023–2024); Journal Club (2021–2023)
- Telescope Operator, McCormick Observatory (2021–Present)
- Astronomy on Tap (Speaker, 2022), Dark Sky Bright Kids (2021–22)
- Volunteer Docent, Cincinnati Observatory (2016–2017)

Observing Proposals

- *The Dark Side of the Force: Unraveling Protostellar Jet Asymmetry by Probing TMC1A's Fainter Red-shifted Outflow with JWST*. Assani, K. D. (PI). JWST Cycle 4, Proposal ID 8872, 7.5 hrs (11% acceptance rate, ~ \$100,000 awarded). [Universe Today News Highlight](#)
- *Imaging Planet Formation at Its Earliest Stages: Measuring the Extinction Level of an Enshrouded Protoplanet*. Wagner, K., Assani, K. D. (Co-I). JWST Cycle 2, Proposal ID 4010 .
- *ALMA Meets JWST: Is There Warm Molecular Gas Near the [Fe] Jet?*. Harsono, D., Assani, K. D. (Co-I). ALMA Cycle 11, Project 2024.1.00046.S
- *Is the Abnormally Low Spectral Index of the Elias 2-27 Disk Caused by Dust Scattering?* Assani, K. D., Lin, D., et al. ALMA Cycle 10, Project 2023.1.00377.S.

Selected Publications

For full list of publications, title and author names, see: [NASA ADS](#); [SciX](#); [ORCID: 0000-0002-2131-4346](#)

- *Mid-infrared extinction curve for protostellar envelopes from JWST-detected embedded jet emission: the case of TMC1A*. Assani, K. et al. (2025). *A&A*, 701, A175.
- *The asymmetric bipolar [Fe II] jet and H₂ outflow of TMC1A resolved with the JWST NIRSpec IFU*. Assani, K. et al. (2024). *A&A*, 688, A26.
- *Dracula's Chivito: Discovery of a large edge-on protoplanetary disk with Pan-STARRS*. Berghea, C.,..., Assani, K. et al. (2024). *ApJL*, 967, L3.
- *Direct images and spectroscopy of a giant protoplanet driving spiral arms in MWC 758*. Wagner, K.,..., Assani, K. et al. (2023). *Nat. Astron.*, 7, 1208–1217.
- *Wavelength-dependent extinction and grain sizes in Dippers*. Sitko, M.,..., Assani, K. et al. (2023). *AJ*, 166, 24.
- *Variability of disk emission in HD 163296*. Pikhartova, M.,..., Assani, K. et al. (2021). *ApJ*, 919, 64.
- *Differences in the gas and dust distribution in the disk of PDS 70*. Long, Z.,..., Assani, K. et al. (2018). *ApJ*, 858, 112.

Invited Talks

- *Probing Star Formation and Dust with JWST Observations of Protostellar Outflows* Sep 2025
University of Cincinnati Astronomy Seminar Series Cincinnati, OH
- *Protostellar Outflows with JWST: From Line Diagnostics to Dust Attenuation* Sep 2025
Space Telescope Science Institute – Dust/ISM Group Baltimore, MD
- *The Birth of Stars: JWST Insights into Protostellar Outflows and Dust in Star-Forming Regions* Mar 2025
Virginia Tech Astronomy Series Blacksburg, VA

Selected Presentations

- *[Fe II] & H₂ Excitation Conditions of the TMC1A Protostellar Outflow*. Specola Vaticana, Italy (Sep 2024)
- *Global Simulations of Planetary Growth via Pebble Accretion*. Gordon Research Conference, Mount Holyoke, MA (Jun 2023)
- *Variability in the Gas and Dust Emission of the UX Orionis Star CQ Tau*. 235th AAS Meeting, Honolulu, HI, Poster #451.01 (Jan 2020)
- *Modeling the Circumstellar Disk of HD 166191*. 233rd AAS Meeting, Seattle, WA, Poster #163.19 (Jan 2019)