Samuel M. Factor

POSTDOCTORAL RESEARCH FELLOW

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Summary and Highlighted Qualifications

Highly motivated researcher seeking to transition into the aerospace industry. Aiming to leverage broad expertise in space-based observational techniques, novel image processing algorithms, statistical data analysis, physical modeling, science communication, and lab experience acquired through a Ph.D. in Astronomy. Learns quickly and can communicate and apply new knowledge efficiently and effectively.

- Programing languages and tools:
  - Fluent: Python, bash (Linux/Unix), git, LaTeX
  - Familiar: C, SQL, Fortran, slurm, Mathematica
- Data visualization (python/matplotlib)
- Statistical analysis and optimization: hierarchical Bayesian modeling and inference (Markov Chain Monte Carlo, nested sampling)
- Communication: Technical writing and oral presentation aimed at a range of audiences
- Space-based imaging (*HST*, *JWST*), data processing and analysis, high-contrast imaging
- Fourier analysis, interferometric data processing (optical, near-infrared, and radio)
- Astronomical Instrumentation: design, review and fabrication of optical, mechanical, electronic, and interface systems (including basic Zemax, LabView, SolidWorks, and machine shop experience)

Research Experience

Software Engineer & Data Scientist as a Postdoctoral Fellow, UT Austin **2023–Present**

- Assessing strengths, weaknesses, and best practice observing strategies for *JWST* high-resolution kernel-phase imaging (using detection limit metrics) to maximize the yield of valuable telescope time.
- PI of a Cycle 1 *JWST* archival program which is funding this work (**$145,090**)

Observational Astronomer & Data Scientist as a Graduate Student Researcher, UT Austin **2015–2023**

- Developed python-based software pipelines run on the Texas Advanced Computing Center (TACC).
- Applied a novel interferometric postprocessing technique which modeled diffraction through the telescope system. Detected faint companions at previously inaccessible separations (below the diffraction limit) and assessed the limits of the technique.
- Studied the formation of companions to low mass stars using *Hubble Space Telescope* (*HST*) imaging. Modeled the demographics of companions to study their formation mechanism. Found evidence that dynamical evolution sculpts young low-mass binaries.
- PI of two *HST* programs which funded this work (**$255,515**), two associated publications +1 in prep.

Software & Electronics as a Graduate & Undergrad Student Researcher**,** Wesleyan Univ. **2012–2015**

- Modeled the structure of a planet-forming disk using interferometric observations of molecular gas.
- Built & tested the scattering properties of RF electronic oscillator circuits modeling optical systems.

Education

Ph.D. in Astronomy — The University of Texas at Austin, Austin, TX **2023**
Concentration in Communicating Science
Dissertation Title: *Kernel-Phase Interferometry for Detection of Close in Companions: Demographics of Binary Brown Dwarfs from Birth to Maturity*

M.A. in Astronomy — Wesleyan University, Middletown, CT **2015**
Thesis Title: *ALMA Observations of Molecular Gas Emission from a Protoplanetary Disk in the Orion Nebula*

B.A. in Physics and Computer Science — Wesleyan University, Middletown, CT **2014**
ΦBK Honor Society, GPA: 3.93/4.0

Communication

Efficient and effective verbal and written communication skills to a wide range of audiences:

- Technical/scientific: presented at domestic and international conferences (full list here), multiple publications in and referee for peer-reviewed Astronomy & Physics journals (see below or here)
- Non-technical: speaker at outreach events, staff writer for astrobites.org, TA for seven courses

Proven track record of proposing innovative science programs: lead author and science-PI of 3 highly competitive space telescope programs (*HST* & *JWST*) as a graduate student including securing significant funding ($400,605) and culminating in presentations and publications.

Professional Development

- Selected Graduate and Undergraduate Coursework:
  - Astronomy: Observational Astronomy, Astronomical Instrumentation (design, review, & fabrication of optical, mechanical, electronic, & interface systems), Planetary Astrophysics (incl. orbital dynamics)
  - Technical tools: Bayesian Statistical Methods, Computational Physics, Software Engineering (incl. agile development/scrum), Algorithms and Complexity, Electronics Lab, Experimental Optics
- Institute for Scientist & Engineer Educators (ISEE) Professional Development Program (2018)
  Intensive teaching workshop focusing on inquiry, assessment, and equity & inclusion

Leadership & Collaboration

- Organizing committee of Astronomy on Tap: Austin, TX (2016–present)
  Monthly public talks on cutting edge astronomy in a bar, drawing crowds of 200–300 people
- Teaching Assistant for seven courses at The University of Texas at Austin and Wesleyan University
- Organized & lead four instructional trips to McDonald Observatory for graduate & undergrad students
- Computer Officer, Astronomy Graduate Student Executive Committee, UT Austin, (2017–2021)
- Member of the Direct Imaging and Spectroscopy of Exoplanetary Systems JWST ERS collaboration
- Member of the astrobites collaboration (staff writer 2018–2019 and webmaster)
- Masters rowing coach at Austin Rowing Club, Four-year collegiate varsity athlete (Men's Crew)
- National Outdoor Leadership School (NOLS) alumni, SCUBA certified + dry suit (28 dives, 20 hours)

Honors and Awards

- Lead author & PI of three space telescope programs (*HST* Cycles 24 & 29, *JWST* Cycle 1, $400,605)
- University Graduate Continuing Fellowship, UT Austin ($40,804)
- Board of Visitors Graduate Student Second Year Research Defense Award, UT Austin
- Frank N. Edmonds, Jr. Memorial Fellowship in Astronomy, UT Austin
- ΦBK, Wesleyan University
- Barry M. Goldwater Scholarship, Honorable Mention

Selected Publications (+10 non first author publications, complete list can be found here)

- *NICMOS Kernel-Phase Interferometry II: Demographics of Nearby Brown* Dwarfs (Samuel M. Factor & Adam L. Kraus, 2023, *The Astronomical Journal*, 165, 130)
- *NICMOS Kernel-Phase Interferometry I: Catalogue of Brown Dwarfs Observed in F110W and F170M* (Samuel M. Factor & Adam L. Kraus, 2022, *The Astronomical Journal*, 164, 244)
- *ALMA Observations of Asymmetric Molecular Gas Emission from a Protoplanetary Disk in the Orion Nebula* (Samuel M. Factor, A. M. Hughes, et al., 2017, *The Astronomical Journal*, 153, 233)