SAMUEL M. FACTOR

Curriculum Vitae

Univ. of Texas at Austin Dept. of Astronomy, 2515 Speedway, Stop C1400, Austin, TX 78712

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EDUCATION

Ph.D., 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*, Advisor: Dr. Adam L. Kraus

M.A., Astronomy, Wesleyan University Middletown, CT 2015

Thesis Title: *ALMA Observations of Molecular Gas Emission from a Protoplanetary Disk in the Orion Nebula*, Advisor: Dr. A. Meredith Hughes

B.A., Physics and Computer Science, Wesleyan University Middletown, CT 2014

ΦBK Honor Society, GPA: 3.93

RESEARCH EXPERIENCE

Postdoctoral Fellow Advisor: Dr. Adam L. Kraus 2023–present

Department of Astronomy, The University of Texas at Austin, Austin, TX

- Assessing the strengths, weaknesses, and best practice observing strategies for *JWST* KPI imaging by calculating detection limits using archival calibration data.

Graduate Student Researcher Advisor: Dr. Adam L. Kraus 2015–2023

Department of Astronomy, The University of Texas at Austin, Austin, TX

- Applied an interferometric analysis technique to archival *Hubble Space Telescope* (*HST*) imaging to search for sub-stellar and planetary mass companions to nearby stars below the diffraction limit.
- Analyzed the statistical demographics of companions in the field and young star-forming regions.
- Analysis utilized the Lonestar5 & 6 clusters at the Texas Advanced Computing Center (TACC).

Graduate Student Researcher Advisor: Dr. A. Meredith Hughes 2014–2015

Astronomy Department, Wesleyan University, Middletown, CT

- Modeled the temperature and density structure of a protoplanetary disk based on molecular gas observations from the Atacama Large Millimeter/submillimeter Array (ALMA).
- Analysis utilized Wesleyan University's High Performance Compute Cluster.

Undergraduate Research Assistant Advisor: Dr. Fred Ellis 2012–2014

Physics Department, Wesleyan University, Middletown, CT

- Built & tested scattering properties of electronic LRC oscillator circuits modeling optical systems.
- Research topics include: PT-symmetric systems, asymmetric wave transport, nonlinear systems.

HONORS & AWARDS

Board of Visitors Graduate Student Second Year Research Defense Award, UT Austin 2017

Chambliss Astronomy Achievement Award, Honorable Mention, AAS Winter, 2016

Frank N. Edmonds, Jr. Memorial Fellowship in Astronomy, UT Austin 2016

ΦBK, Wesleyan University Spring, 2014

Barry M. Goldwater Scholarship, Honorable Mention 2013

Karl Van Dyke Prize, Wesleyan University Physics Dept. 2013

Dean's List, Wesleyan University 2010 - 2014

FUNDING

Kernel-Phase Detection Limits for Planet Discovery with JWST — $145,090
PI of Cycle 1 James Webb Space Telescope Archival Research Grant 2509 — 2021

Discovery of Young Planetary Systems with Kernel-Phase Interferometry — $114,085
PI of Cycle 29 Hubble Space Telescope Archival Research Grant 16612 — 2021

University Graduate Continuing Fellowship — $40,804
The University of Texas at Austin Graduate School — 2018

Kernel-Phase Interferometry for Super-resolution Detection of Faint Companions — $141,430
PI of Cycle 24 Hubble Space Telescope Archival Research Grant 14561 — 2016

John W. Cox Graduate Excellence Fellowship — $18,000
University of Texas at Austin Dept. of Astronomy recruiting Fellowship — 2015

Travel to: 225th Meeting of the American Astronomical Society — $1,000
Student Travel Grant, CT Space Grant College Consortium — 2015

TEACHING EXPERIENCE

Professional Development Program, *Inst. for Scientist & Engineer Educators* — 2018, 2020(canceled)
Intensive teaching workshop focusing on inquiry, assessment, and equity & inclusion.

Teaching Assistant *Department of Astronomy, The University of Texas at Austin, Austin, TX*

AST 307: Introductory Astronomy, Prof. Brendan Bowler — Fall 2020
AST 376/392G: Observational Methods in Astronomy, Profs. A. Kraus & S. Finkelstein — Fall 2018
AST 301: Introduction to Astronomy, Prof. John Scalo — Fall 2015

Teaching Assistant *Astronomy Department, Wesleyan University, Middletown, CT*

ASTR 107: The Universe, ASTR 211: Observational Astronomy, Prof. A. Meredith Hughes — 2014, 2015

Course Assistant *Computer Science and Physics Departments, Wesleyan University, Middletown, CT*

COMP 112: Intro. to Programming, Prof. James Lipton — Summer 2012
PHYS 215: Special Relativity, Prof. Fred Ellis — Fall 2013

OUTREACH AND SERVICE

Astronomy on Tap, Austin TX, Organizing Committee and Speaker — 2016–Present
Present free, accessible astronomy talks in a bar to $\sim$ 300 people monthly. Watch my talks on my website.

Astrobites, Author and Webmaster — 2018–2019
Wrote brief paper summaries accessible to undergraduate level students. Read my posts on astrobites.org

Graduate Student Observing Trip, Trip Leader — 2023
Co-lead trip to McDonald Observatory to teach early career graduate students about observing

TAURUS Summer Program, Observing Trip Committee, Webmaster, Informal Mentor — 2017, 2019, 2021
Organized and lead the REU program's observing trip to McDonald Observatory.

UT Austin Girl Day Festival, Volunteer — 2017, 2018, 2021, 2023
Facilitated hands on astronomy activities for over 8,000 middle school girls and their families.

Astronomy Graduate Student Executive Committee, UT Austin, Computer Officer — 2017–2021

Ask an Astronomer, Author, askanastronomer.org — 2015–2016

Public Observing, Van Vleck Observatory, Wesleyan University, Middletown, CT — 2014–2015

PROGRAMMING LANGUAGES & SOFTWARE

Python, Git, LaTeX, MIRIAD, CASA, Mathematica, Fortran, C, Ruby, Rails, Java, Visual Basic, SML, Agda

PUBLICATIONS

Samuel M. Factor & Adam L. Kraus, 2023, *AJ*, 165, 130, "NICMOS Kernel-Phase Interferometry II: Demographics of Nearby Brown Dwarfs"

Samuel M. Factor & Adam L. Kraus, 2022, *AJ*, 164, 244, "NICMOS Kernel-Phase Interferometry I: Catalogue of Brown Dwarfs Observed in F110W and F170M"

Samuel M. Factor, A. M. Hughes, K. Flaherty, et al., 2017, *AJ*, 153, 233, "ALMA Observations of Asymmetric Molecular Gas Emission from a Protoplanetary Disk in the Orion Nebula"

S. Petrus et al. (incl. **S. Factor**, 43 of 121), submitted to ApJ Letters, "The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems V: Do Self-Consistent Atmospheric Models Represent JWST Spectra? A Showcase With VHS 1256 b"

S. Sallum et al. (incl. **S. Factor**, 9 of 122), 2024, *ApJL*, 963, L2 "The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems IV. NIRISS Aperture Masking Interferometry Performance and Lessons Learned"

S. Ray et al. (incl. **S. Factor**, 12 of 123), submitted to ApJ Letters, "The *JWST* Early Release Science Program for Direct Observations of Exoplanetary Systems III: Aperture Masking Interferometric Observations of the star HIP 65426 at 3.8μm"

A. Carter et al. (incl. **S. Factor**, 79 of 111), 2023, *ApJL*, 951, L20, "The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems I: High Contrast Imaging of the Exoplanet HIP 65426 b from 2-16 μm"

B. Miles et al. (incl. **S. Factor**, 80 of 111), 2023, *ApJL*, 946, L6, "The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems II: A 1 to 20 Micron Spectrum of the Planetary-Mass Companion VHS 1256-1257 b"

S. Hinkley et al. (incl. **S. Factor**, 46 of 89), 2022, *PASP*, 134, 095003, "The JWST Early Release Science Program for the Direct Imaging & Spectroscopy of Exoplanetary Systems"

A. W. Mann et al. (incl. **S. Factor**, 10 of 14), 2019, *ApJ*, 871, 63, "How to Constrain Your M Dwarf. II. The Mass–Luminosity–Metallicity Relation from 0.075 to 0.70 Solar Masses"

J. M. Lee, **S. Factor**, Z. Lin, et al., "Reconfigurable directional lasing modes in cavities with generalized $\mathcal{P}\tilde{\mathcal{T}}$ Symmetry," *Phys. Rev. Lett.*, vol 112, p. 253902, Jun 2014

M. Chitsazi, **S. Factor**, J. Schindler, et al., "Experimental observation of lasing shutdown via asymmetric gain," *Phys. Rev. A*, vol. 89, p. 043842, Apr 2014

N. Bender, **S. Factor**, J. D. Bodyfelt, et al., "Observation of asymmetric transport in structures with active nonlinearities," *Phys. Rev. Lett.*, vol. 110, p. 234101, June 2013

PRESENTATIONS

Kernel-Phase Interferometry for Detection of Close in Companions: Binary Demographics of Brown Dwarfs from Birth to Maturity (talk number 432.04D), *243rd Meeting of the AAS*, January 2024, New Orleans, LA

HST Kernel-Phase Interferometry: Binary Brown Dwarf Demographics from Birth to Maturity (poster), *Exoplanets: Atmospheres to Architectures, GMT Community Science Meeting*, Sep. 2023, Washington, DC

Kernel-Phase Interferometry for Detection of Close in Companions: Binary Demographics of Brown Dwarfs from Birth to Maturity (talk), *Public Ph.D. defense*, July 2023, Austin, TX

HST Kernel-Phase Interferometry: Field-Age Brown Dwarf Population Demographics (poster), *21st Cambridge Workshops of Cool Stars, Stellar Systems, and the Sun*, July 2022, Toulouse, France

A NICMOS Kernel-Phase Interferometry Survey of Brown-Dwarf Binary Demographics (invited talk), *CfA Stars & Planets Seminar*, December 2021, Center for Astrophysics, Cambridge, MA

A NICMOS Kernel-Phase Interferometry Survey of Brown-Dwarf Binary Demographics (invited talk),
Stars and Planets Lunch And Talks (SPLAT), November 2021, Institute for Astronomy, Manoa, HI

A NICMOS Kernel-Phase Interferometry Survey of Brown-Dwarf Binary Demographics (talk),
Virtual Masking Hackathon, July 2021, Virtual

Kernel-Phase Interferometry for Super-Resolution Detection of Faint Companions (poster),
20.5th Cambridge Workshops of Cool Stars, Stellar Systems, and the Sun, March 2021, Virtual

Kernel-Phase Interferometry for Super-Resolution Detection of Faint Companions (poster),
Extreme Solar Systems IV, August 2019, Reykjavik, Iceland

Kernel-Phase Interferometry for Super-Resolution Detection of Faint Companions (poster),
Stars: Birth and Death, 6th Annual GMT Community Science Meeting, September 2018, Honolulu, HI

Kernel-Phase Interferometry for Super-Resolution Detection of Faint Companions (poster),
20th Cambridge Workshop of Cool Stars, Stellar Systems, and the Sun, August 2018, Boston, MA

Kernel-Phase Interferometry for Super-Resolution Detection of Faint Companions (poster),
Star and Planet Formation in the Southwest 2, March 2018, Oracle, AZ

Are we alone? Finding and characterizing planets around other stars (invited talk),
McDonald Observatory Board of Visitors Recruiting Event, February, 2018, Houstion, TX

Kernel-Phase Interferometry for Super-Resolution Detection of Faint Companions (poster number 118.03),
230th Meeting of the AAS, June 2017, Austin, TX

Kernel-Phase Interferometry for Super-Resolution Detection of Faint Companions (poster number 146.25),
229th Meeting of the AAS, January 2017, Grapevine, TX (Chambliss Honorable Mention)

`Git` is great! (slides),
UT Austin Graduate Student Postdoc Seminar, November 2016, Austin, TX

Kernel-Phase Interferometry for Super-Resolution Detection of Faint Companions (poster),
Sagan Exoplanet Summer Workshop, July 2016, Pasadena, CA

Characterizing a Young Protoplanetary Disk in the Orion Nebula Cluster (poster number 349.06),
225th Meeting of the American Astronomical Society, January 2015, Seattle, WA

OBSERVING EXPERIENCE

JWST Cycle 1 (Archival)	(see Funding)
HST NICMOS, ACS, Cycle 24, 29 (Archival)	(see Funding)
0.8m Telescope, PFC, McDonald Observatory (P.I. Observing Course)	>30 nights
0.9m Telescope, eyepiece, McDonald Observatory (P.I. Graduate Student Course)	4 nights
Harlan J. Smith 2.7m, DIAFI, McDonald Observatory (P.I. TAURUS, Observing Course)	4 nights
HJS 2.7m, GCMS (VIRUS-P), McDonald Observatory (P.I. TAURUS)	3 nights
HJS 2.7m, Tull Coude Spectrograph (TS23), McDonald Obs. (P.I. A. Rizzuto, Observing Course)	12 nights
Keck II, NIRC2 LGS, Mauna Kea Observatory, (P.I. A. Mann)	1 night

EXTRACURRICULAR ACTIVITIES

Volunteer Coach, Austin Rowing Club	2017–Present
Certified Open Water Diver, PADI (28 dives, 20 hours)	2013–Present
Volunteer Assistant Coach, Wesleyan University Men's Varsity Rowing	Fall, 2015
Wesleyan University Men's Varsity Rowing	2010–2014
NESCAC All Sportsmanship Team, New England Small College Athletic Conference	2014
NESCAC All Academic Team, New England Small College Athletic Conference	2012–2014
Stewards' All Academic Team, Eastern College Athletic Conference	2012–2014
New England Rowing Championships Men's JV 8+, 3rd place	2013, 2014
Head of the Charles Men's Collegiate 8+, 5th place	2013

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