

# Arjun B. Savel

Ph.D. Candidate, Astrophysics Researcher

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## EDUCATION

### University of Maryland, College Park

Ph.D., Astronomy

M.S., Astronomy | Advisor: Prof. Eliza M.-R. Kempton

College Park, MD

expected Spring 2026

2022

### University of California, Berkeley

B.A., Astrophysics; B.A., Physics | Advisor: Prof. Courtney D. Dressing

Berkeley, CA

2020

## POSITIONS

### Graduate Researcher — University of Maryland, College Park

Inferring spatial variation in the atmospheres of hot gas giants | Advisor: Prof. Eliza M.-R. Kempton

College Park, MD

2020–current

### Pre-Doctoral Program Research Analyst — Center for Computational Astrophysics, Flatiron Institute

The uncertainty budget of high-resolution cross-correlation spectroscopy | Advisor: Dr. Megan Bedell

New York, NY

2022–2023

### Research Assistant — University of California, Berkeley

Exoplanet occurrence rates and imaging of Kepler stars | Advisors: Prof. Courtney D. Dressing & Prof. Lea A. Hirsch

Berkeley, CA

2018–2020

## SELECTED & CURRENT RESEARCH INTERESTS

- Measuring spatial variation (wind, chemical, aerosol, and thermal structures) in exoplanet atmospheres
- Extracting maximal information from high-resolution spectroscopy with cross-correlation techniques
- Characterizing a wide range of exoplanetary systems

## PUBLICATIONS

citations: 1559 / h-index: 23 / 7 first-author refereed

### FIRST- AND SECOND-AUTHOR PUBLICATIONS

- 8 Arnold, Kenneth E.; **Savel, Arjun**; Kempton, Eliza M.-R.; Roman, Michael T. *et al.* 2025, *Out on a Limb: The Signatures of East–West Asymmetries in Transmission Spectra from General Circulation Models*, ApJ, 986, 187 (arXiv:2504.14060) [2 citations]
- 7 **Savel, Arjun**; Bedell, Megan; Kempton, Eliza M.-R.; Smith, Peter C. B. *et al.* 2025, *Peering into the Black Box: Forward Modeling of the Uncertainty Budget of High-resolution Spectroscopy of Exoplanet Atmospheres*, AJ, 169, 135 (arXiv:2411.07303) [5 citations]
- 6 **Savel, Arjun**; Bedell, Megan; & Kempton, Eliza 2024, *cortecs: A Python package for compressing opacities*, JOSS, 9, 6104 (arXiv:2402.07047)
- 5 **Savel, Arjun**; Beltz, Hayley; Komacek, Thaddeus D.; Tsai, Shang-Min *et al.* 2024, *A New Lever on Exoplanetary B Fields: Measuring Heavy Ion Velocities*, ApJ, 969 (arXiv:2406.12512) [8 citations]
- 4 **Savel, Arjun**; Kempton, Eliza M.-R.; Rauscher, Emily; Komacek, Thaddeus D. *et al.* 2023, *Diagnosing Limb Asymmetries in Hot and Ultrahot Jupiters with High-resolution Transmission Spectroscopy*, ApJ, 944, 99 (arXiv:2301.01694) [24 citations]
- 3 **Savel, Arjun**; Hirsch, Lea A.; \*Gill, Holden; Dressing, Courtney D. *et al.* 2022, *SLIMMER: A Pipeline for Reducing and Analyzing Images of Stars*, PASP, 134, 124501 (arXiv:2212.00641) [10 citations]
- 2 **Savel, Arjun**; Kempton, Eliza M.-R.; Malik, Matej; Komacek, Thaddeus D. *et al.* 2022, *No Umbrella Needed: Confronting the Hypothesis of Iron Rain on WASP-76b with Post-processed General Circulation Models*, ApJ, 926, 85 (arXiv:2109.00163) [58 citations]
- 1 **Savel, Arjun**; Dressing, Courtney D.; Hirsch, Lea A.; Ciardi, David R. *et al.* 2020, *A Closer Look at Exoplanet Occurrence Rates: Considering the Multiplicity of Stars without Detected Planets*, AJ, 160, 287 (arXiv:2011.09564) [42 citations]

## OTHER REFEREED PUBLICATIONS

- 46 Wilson, Thomas G.; Simpson, Anna M.; Collier Cameron, Andrew; Cloutier, Ryan *et al.* (173 other co-authors, incl. **Savel, Arjun**) 2026, *Gas-depleted planet formation occurred in the four-planet system around the red dwarf LHS 1903*, ArXiv (arXiv:2602.11271)
- 45 Nixon, Matthew C.; Somers, R. Sander; **Savel, Arjun**; Ih, Jegug *et al.* 2025, *Magma Ocean Interactions Can Explain JWST Observations of the Sub-Neptune TOI-270 d*, ApJ, 995, 95 (arXiv:2510.07367) [9 citations]
- 44 Sanchez, Jorge A.; Smith, Peter C. B.; Kanumalla, Krishna; Welbanks, Luis *et al.* (17 other co-authors, incl. **Savel, Arjun**) 2025, *A Stellar Magnesium to Silicon ratio in the atmosphere of an exoplanet*, ArXiv (arXiv:2512.10904)
- 43 Yee, Samuel W.; Winn, Joshua N.; Hartman, Joel D.; Rodriguez, Joseph E. *et al.* (122 other co-authors, incl. **Savel, Arjun**) 2025, *The TESS Grand Unified Hot Jupiter Survey. III. Thirty More Giant Planets*, The Astrophysical Journal Supplement Series, 280, 30 (arXiv:2507.01855) [3 citations]
- 42 Soubkiou, Abderahmane; Barkaoui, Khalid; Benkhaldoun, Zouhair; Ghachoui, Mourad *et al.* (42 other co-authors, incl. **Savel, Arjun**) 2025, *TOI-1846 b: a super-Earth in the radius valley orbiting a nearby M dwarf*, MNRAS, 541, 3249 (arXiv:2506.18550)
- 41 Noti, Pascal A.; Lee, Elspeth K. H.; Kitzmann, Daniel; MacDonald, Ryan *et al.* (5 other co-authors, incl. **Savel, Arjun**) 2025, *Modelling the 3D atmospheric structure of the cold Jupiter WD1856+534b orbiting a white dwarf*, MNRAS (arXiv:2507.05422)
- 40 Panwar, Vatsal; Brogi, Matteo; Kanumalla, Krishna; Line, Michael R. *et al.* (17 other co-authors, incl. **Savel, Arjun**) 2025, *The Roasting Marshmallows Program with IGRINS on Gemini South III: Seeing deeper into the metal depleted atmosphere of a gas-giant on the cusp of the hot to ultra-hot Jupiter transition*, MNRAS, 541, 3561 (arXiv:2507.07204) [1 citation]
- 39 Malsky, Isaac; Rauscher, Emily; Stevenson, Kevin; **Savel, Arjun** *et al.* (10 other co-authors, incl. **Savel, Arjun**) 2025, *Clouds and Hazes in GJ 1214 b's Metal-rich Atmosphere*, AJ, 169, 221 (arXiv:2503.22608) [8 citations]
- 38 Barkaoui, K.; Korth, J.; Gaidos, E.; Agol, E. *et al.* (119 other co-authors, incl. **Savel, Arjun**) 2025, *TOI-2015 b: A sub-Neptune in strong gravitational interaction with an outer non-transiting planet*, A&A, 695 (arXiv:2502.07074) [5 citations]
- 37 Crossfield, Ian J. M.; Polanski, Alex S.; Robertson, Paul; Murphy, Joseph Akana *et al.* (61 other co-authors, incl. **Savel, Arjun**) 2025, *OrCAS: Origins, Compositions, and Atmospheres of Sub-Neptunes. I. Survey Definition*, AJ, 169, 89 (arXiv:2411.16836) [4 citations]
- 36 Bartelt, Dare; Mansfield, Megan Weiner; Line, Michael R.; Parmentier, Vivien *et al.* (8 other co-authors, incl. **Savel, Arjun**) 2025, *A Measurement of the Water Abundance in the Atmosphere of the Hot Jupiter WASP-43b with High-resolution Cross-correlation Spectroscopy*, AJ, 169, 101 (arXiv:2411.17923) [1 citation]
- 35 Smith, Peter C. B.; Sanchez, Jorge A.; Line, Michael R.; Rauscher, Emily *et al.* (19 other co-authors, incl. **Savel, Arjun**) 2024, *The Roasting Marshmallows Program with IGRINS on Gemini South. II. WASP-121 b has Superstellar C/O and Refractory-to-volatile Ratios*, AJ, 168, 293 (arXiv:2410.19017) [25 citations]
- 34 Ehrhardt, Juliana; Thomas, Luis; Kellermann, Hanna; Freitag, Christine *et al.* (57 other co-authors, incl. **Savel, Arjun**) 2024, *Confirmation of four hot Jupiters detected by TESS using follow-up spectroscopy from MaHPS at Wendelstein together with NEID and TRES*, A&A, 692 (arXiv:2501.04383) [2 citations]
- 33 Peláez-Torres, A.; Esparza-Borges, E.; Pallé, E.; Parviainen, H. *et al.* (62 other co-authors, incl. **Savel, Arjun**) 2024, *Validation of up to seven TESS planet candidates through multi-colour transit photometry using MuSCAT2 data*, A&A, 690 (arXiv:2409.07400) [6 citations]
- 32 Carleo, Ilaria; Barrágan, Oscar; Persson, Carina M.; Fridlund, Malcolm *et al.* (68 other co-authors, incl. **Savel, Arjun**) 2024, *Mass determination of two Jupiter-sized planets orbiting slightly evolved stars: TOI-2420 b and TOI-2485 b*, A&A, 690 (arXiv:2408.05612) [2 citations]
- 31 Espinoza, Néstor; Steinrueck, Maria E.; Kirk, James; MacDonald, Ryan J. *et al.* (40 other co-authors, incl. **Savel, Arjun**) 2024, *Inhomogeneous terminators on the exoplanet WASP-39 b*, Nature, 632, 1017 (arXiv:2407.10294) [41 citations]
- 30 Fu, Guangwei; Welbanks, Luis; Deming, Drake; Inglis, Julie *et al.* (15 other co-authors, incl. **Savel, Arjun**) 2024, *Hydrogen sulfide and metal-enriched atmosphere for a Jupiter-mass exoplanet*, Nature, 632, 752 (arXiv:2407.06163) [51 citations]
- 29 Schulte, Jack; Rodriguez, Joseph E.; Bieryla, Allyson; Quinn, Samuel N. *et al.* (72 other co-authors, incl. **Savel, Arjun**) 2024, *Migration and Evolution of giant ExoPlanets (MEEP). I. Nine Newly Confirmed Hot Jupiters from the TESS Mission*, AJ, 168, 32 (arXiv:2401.05923) [14 citations]
- 28 Polanski, Alex S.; Lubin, Jack; Beard, Corey; Akana Murphy, Joseph M. *et al.* (70 other co-authors, incl. **Savel, Arjun**) 2024, *The TESS-Keck Survey. XX. 15 New TESS Planets and a Uniform RV Analysis of All Survey Targets*, The Astrophysical Journal Supplement Series, 272, 32 (arXiv:2405.14786) [45 citations]
- 27 Parviainen, H.; Murgas, F.; Esparza-Borges, E.; Peláez-Torres, A. *et al.* (59 other co-authors, incl. **Savel, Arjun**) 2024, *TOI-2266 b: A keystone super-Earth at the edge of the M dwarf radius valley*, A&A, 683 (arXiv:2401.11879) [5 citations]
- 26 Tsai, Shang-Min; Parmentier, Vivien; Mendonça, João M.; Tan, Xianyu *et al.* (7 other co-authors, incl. **Savel, Arjun**) 2024, *Global Chemical Transport on Hot Jupiters: Insights from the 2D VULCAN Photochemical Model*, ApJ, 963, 41 (arXiv:2310.17751) [18 citations]
- 25 Malsky, Isaac; Rauscher, Emily; Roman, Michael T.; Lee, Elspeth K. H. *et al.* (5 other co-authors, incl. **Savel, Arjun**) 2024, *A Direct Comparison between the Use of Double Gray and Multiwavelength Radiative Transfer in a General Circulation Model with and without Radiatively Active Clouds*, ApJ, 961, 66 (arXiv:2311.01506) [16 citations]
- 24 Rasmussen, Kaitlin C.; Currie, Miles H.; Hagee, Celeste; van Buchem, Christiaan *et al.* (17 other co-authors, incl. **Savel, Arjun**) 2023, *A Nondetection of Iron in the First High-resolution Emission Study of the Lava Planet 55 Cnc e*, AJ, 166, 155 (arXiv:2308.10378) [11 citations]
- 23 Coulombe, Louis-Philippe; Benneke, Björn; Challener, Ryan; Piette, Anjali A. A. *et al.* (73 other co-authors, incl. **Savel, Arjun**) 2023, *A*

- broadband thermal emission spectrum of the ultra-hot Jupiter WASP-18b*, Nature, 620, 292 (arXiv:2301.08192) [139 citations]
- 22 Kempton, Eliza M.-R.; Zhang, Michael; Bean, Jacob L.; Steinrueck, Maria E. *et al.* (30 other co-authors, incl. **Savel, Arjun**) 2023, *A reflective, metal-rich atmosphere for GJ 1214b from its JWST phase curve*, Nature, 620, 67 (arXiv:2305.06240) [140 citations]
  - 21 Dai, Fei; Schlaufman, Kevin C.; Reggiani, Henrique; Bouma, Luke *et al.* (48 other co-authors, incl. **Savel, Arjun**) 2023, *A Mini-Neptune Orbiting the Metal-poor K Dwarf BD+29 2654*, AJ, 166, 49 (arXiv:2306.08179) [15 citations]
  - 20 Tuson, A.; Queloz, D.; Osborn, H. P.; Wilson, T. G. *et al.* (119 other co-authors, incl. **Savel, Arjun**) 2023, *TESS and CHEOPS discover two warm sub-Neptunes transiting the bright K-dwarf HD 15906*, MNRAS, 523, 3090 (arXiv:2306.04511) [16 citations]
  - 19 Gao, Peter; Piette, Anjali A. A.; Steinrueck, Maria E.; Nixon, Matthew C. *et al.* (12 other co-authors, incl. **Savel, Arjun**) 2023, *The Hazy and Metal-rich Atmosphere of GJ 1214 b Constrained by Near- and Mid-infrared Transmission Spectroscopy*, ApJ, 951, 96 (arXiv:2305.05697) [64 citations]
  - 18 Beltz, Hayley; Rauscher, Emily; Kempton, Eliza M.-R.; Malsky, Isaac *et al.* (2 other co-authors, incl. **Savel, Arjun**) 2023, *Magnetic Effects and 3D Structure in Theoretical High-resolution Transmission Spectra of Ultrahot Jupiters: the Case of WASP-76b*, AJ, 165, 257 (arXiv:2302.13969) [23 citations]
  - 17 Rodriguez, Joseph E.; Quinn, Samuel N.; Vanderburg, Andrew; Zhou, George *et al.* (130 other co-authors, incl. **Savel, Arjun**) 2023, *Another shipment of six short-period giant planets from TESS*, MNRAS, 521, 2765 (arXiv:2205.05709) [31 citations]
  - 16 Lillo-Box, J.; Gandolfi, D.; Armstrong, D. J.; Collins, K. A. *et al.* (62 other co-authors, incl. **Savel, Arjun**) 2023, *TOI-969: a late-K dwarf with a hot mini-Neptune in the desert and an eccentric cold Jupiter*, A&A, 669 (arXiv:2210.08996) [22 citations]
  - 15 Beltz, Hayley; Rauscher, Emily; Kempton, Eliza M.-R.; Malsky, Isaac *et al.* (4 other co-authors, incl. **Savel, Arjun**) 2022, *Magnetic Drag and 3D Effects in Theoretical High-resolution Emission Spectra of Ultrahot Jupiters: the Case of WASP-76b*, AJ, 164, 140 (arXiv:2204.12996) [41 citations]
  - 14 Esparza-Borges, E.; Parviainen, H.; Murgas, F.; Pallé, E. *et al.* (45 other co-authors, incl. **Savel, Arjun**) 2022, *A hot sub-Neptune in the desert and a temperate super-Earth around faint M dwarfs. Color validation of TOI-4479b and TOI-2081b*, A&A, 666 (arXiv:2206.10643) [12 citations]
  - 13 Newton, Elisabeth R.; Rampalli, Rayna; Kraus, Adam L.; Mann, Andrew W. *et al.* (36 other co-authors, incl. **Savel, Arjun**) 2022, *TESS Hunt for Young and Maturing Exoplanets (THYME). VII. Membership, Rotation, and Lithium in the Young Cluster Group-X and a New Young Exoplanet*, AJ, 164, 115 (arXiv:2206.06254) [28 citations]
  - 12 Gandhi, Siddharth; Kesseli, Aurora; Snellen, Ignas; Brogi, Matteo *et al.* (5 other co-authors, incl. **Savel, Arjun**) 2022, *Spatially resolving the terminator: variation of Fe, temperature, and winds in WASP-76 b across planetary limbs and orbital phase*, MNRAS, 515, 749 (arXiv:2206.11268) [53 citations]
  - 11 Yee, Samuel W.; Winn, Joshua N.; Hartman, Joel D.; Rodriguez, Joseph E. *et al.* (69 other co-authors, incl. **Savel, Arjun**) 2022, *The TESS Grand Unified Hot Jupiter Survey. I. Ten TESS Planets*, AJ, 164, 70 (arXiv:2205.09728) [25 citations]
  - 10 Gan, Tianjun; Soubkiou, Abderahmane; Wang, Sharon X.; Benkhaldoun, Zouhair *et al.* (63 other co-authors, incl. **Savel, Arjun**) 2022, *TESS discovery of a sub-Neptune orbiting a mid-M dwarf TOI-2136*, MNRAS, 514, 4120 (arXiv:2202.10024) [22 citations]
  - 9 Murakami, Yukei S.; Jennings, Connor; Hoffman, Andrew M.; **Savel, Arjun** *et al.* (7 other co-authors, incl. **Savel, Arjun**) 2022, *PIPS, an advanced platform for period detection in time series - I. Fourier-likelihood periodogram and application to RR Lyrae stars*, MNRAS, 514, 4489 (arXiv:2107.14223) [3 citations]
  - 8 Giacalone, Steven; Dressing, Courtney D.; Hedges, Christina; Kostov, Veselin B. *et al.* (108 other co-authors, incl. **Savel, Arjun**) 2022, *Validation of 13 Hot and Potentially Terrestrial TESS Planets*, AJ, 163, 99 (arXiv:2201.12661) [33 citations]
  - 7 Dong, Jiayin; Huang, Chelsea X.; Zhou, George; Dawson, Rebekah I. *et al.* (56 other co-authors, incl. **Savel, Arjun**) 2022, *NEID Rossiter-McLaughlin Measurement of TOI-1268b: A Young Warm Saturn Aligned with Its Cool Host Star*, ApJ, 926 (arXiv:2201.12836) [20 citations]
  - 6 de Leon, J. P.; Livingston, J.; Endl, M.; Cochran, W. D. *et al.* (24 other co-authors, incl. **Savel, Arjun**) 2021, *37 new validated planets in overlapping K2 campaigns*, MNRAS, 508, 195 (arXiv:2108.05621) [29 citations]
  - 5 May, Erin M.; Komacek, Thaddeus D.; Stevenson, Kevin B.; Kempton, Eliza M.-R. *et al.* (15 other co-authors, incl. **Savel, Arjun**) 2021, *Spitzer Phase-curve Observations and Circulation Models of the Inflated Ultrahot Jupiter WASP-76b*, AJ, 162, 158 (arXiv:2107.03349) [47 citations]
  - 4 Cloutier, Ryan; Charbonneau, David; Stassun, Keivan G.; Murgas, Felipe *et al.* (63 other co-authors, incl. **Savel, Arjun**) 2021, *TOI-1634 b: An Ultra-short-period Keystone Planet Sitting inside the M-dwarf Radius Valley*, AJ, 162, 79 (arXiv:2103.12790) [32 citations]
  - 3 Foreman-Mackey, Daniel; Luger, Rodrigo; Agol, Eric; Barclay, Thomas *et al.* (13 other co-authors, incl. **Savel, Arjun**) 2021, *exoplanet: Gradient-based probabilistic inference for exoplanet data & other astronomical time series*, JOSS, 6, 3285 (arXiv:2105.01994) [218 citations]
  - 2 Rodriguez, Joseph E.; Quinn, Samuel N.; Zhou, George; Vanderburg, Andrew *et al.* (115 other co-authors, incl. **Savel, Arjun**) 2021, *TESS Delivers Five New Hot Giant Planets Orbiting Bright Stars from the Full-frame Images*, AJ, 161, 194 (arXiv:2101.01726) [40 citations]
  - 1 Demory, B.-O.; Pozuelos, F. J.; Gómez Maqueo Chew, Y.; Sabin, L. *et al.* (70 other co-authors, incl. **Savel, Arjun**) 2020, *A super-Earth and a sub-Neptune orbiting the bright, quiet M3 dwarf TOI-1266*, A&A, 642 (arXiv:2009.04317) [90 citations]

#### UNDER REVIEW

- 1 Steinrueck, Maria E.; **Savel, Arjun**; Christie, Duncan A.; Carone, Ludmila *et al.* 2025, *Limb Asymmetries on WASP-39b: A Multi-GCM Comparison of Chemistry, Clouds, and Hazes*, ArXiv (arXiv:2509.21588) [2 citations]

## PUBLIC SOFTWARE

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- 4 **cortecs**: compress your opacity functions by an order of magnitude
- 3 **hires-literature**: a largely complete database for ground-based high-resolution spectroscopy
- 2 **scopec**: simulating ground-based high-resolution spectroscopy
- 1 **SImMER**: modular data reduction for ground-based imaging

## SELECTED HONORS, PRIZES, & AWARDS

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- 15 Andrew S. Wilson Prize for Excellence in Research, Department of Astronomy, UMD, College Park (2025)
- 14 Service Award, Department of Astronomy, UMD, College Park (2025)
- 13 Outstanding Graduate Assistant Award, UMD, College Park (2025)
- 12 International Conference Student Support Award, UMD, College Park (2024)
- 11 Winner, Three-Minute Thesis Pre-Candidacy Competition, College of Computer, Mathematical, and Natural Sciences, UMD, College Park (2023)
- 10 Winner, Best Poster, Burgers Research Symposium, UMD, College Park (2023)
- 9 Outstanding Graduate TA Award, Department of Astronomy, UMD, College Park (2023)
- 8 CCA Pre-Doctoral Program Fellow, Flatiron Institute Center for Computational Astrophysics (2022)
- 7 Gregor and Donat Wentzel Scholarship, Department of Astronomy, UMD, College Park (2020)
- 6 Student commencement speaker, Astronomy Department, UC Berkeley (2020)
- 5 Outstanding Graduate Student Instructor Award, Astronomy Department, UC Berkeley (2020)
- 4 Chambliss Astronomy Achievement Student Award, AAS 235 (2020)
- 3 1st place, Astronomy Poster Summer Intern Symposium, Astronomy Department, UC Berkeley (2019)
- 2 Student Technology Fund grant for ULAB, UC Berkeley (2018)
- 1 Ongoing Physics Department funding for ULAB, UC Berkeley (2018)

## OBSERVING PROGRAMS

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contributions: 4 PI / 1 Co-PI / 8 Co-I

### JWST

- Co-PI.** *The only known atmosphere on a rocky exoplanet?* (19.8 hours; PI: Zhang)
- Co-I.** *The Warm Jupiter Opportunity for Understanding Giant Exoplanet Evolution* (59.6 hours; PI: Gao)
- Co-I.** *Resolving Atmospheric Uncertainties and Building a Legacy Dataset for WASP-39b* (18.5 hours; PI: Welbanks)
- Co-I.** *Detecting ongoing gas-to-solid nucleation on the ultra-hot planet WASP-76 b* (10.5 hours; PI: Baeyens)
- Co-I.** *From Dawn to Dusk: Diagnosing Asymmetric Limbs in Exoplanet Transmission Spectra* (archival; PI: Kempton)
- Co-I.** *A Deep Molecular Survey of HD 189733b* (39.8 hours; PI: Deming)

### 8-meter Unit Telescope, VLT (ESPRESSO, CRIRES<sup>+</sup>)

- PI.** *Bridging stars and planets: the atmosphere of TOI-2109b with ESPRESSO* (11 hours)
- PI.** *Surveying the desert from the ridge: constraining hot Neptune evolution with WASP-166b* (19.2 hours)

### 4.3-meter Lowell Discovery Telescope (EXPRES)

- PI.** *Measuring an exoplanet's magnetic field through its variable circulation* (27.6 hours across 2 semesters)
- PI.** *Unveiling the atmosphere of the highly irradiated ultra-hot Jupiter TOI-2109b* (7.6 hours)
- Co-I.** *Atmospheric characterization of the inflated hot Jupiter KELT-4 A b* (11.3 hours, PI: Nixon)

### 3-meter Shane Telescope (ShARCS)

**Co-I.** *Looking for Close Stellar Companions to Potential Targets for Future Searches for Life with the Habitable Worlds Observatory* (PI: Dressing) (5 nights)

Observer: Assisted with 14.5 nights (PI: Dressing)

### 2.7 meter Harlan J. Smith Telescope (IGRINS)

**Co-I.** *Revealing the impact of telluric variability on high-resolution spectroscopy with IGRINS* (PI: Morley)

### 10-meter Keck Telescope (NIRC2)

Observer: Assisted with 1/2 night (PI: Dressing)

## SCIENCE TALKS

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### INVITED TALKS

- 4 **Arjun Savel**, Megan Bedell, et al. 2024. Exoplanets, Star, and Planet formation seminar, Space Telescope Science Institute, Baltimore, MD.
- 3 **Arjun Savel**, Eliza M.-R. Kempton, et al. 2023. College of Mathematical and Natural Sciences Board of Visitors. University of Maryland, College Park, MD.



- 2 **Arjun Savel**, Megan Bedell, et al. 2023. "Knowing when to know: bridging data-driven and physics-driven modeling for exoplanet atmospheres." Center for Theory and Computation Lunch Talk, Department of Astronomy, University of Maryland, College Park, MD.
- 1 **Arjun Savel**, Eliza M.-R. Kempton, et al. 2021. "No umbrella needed: Confronting the hypothesis of iron rain on WASP-76b with post-processed general circulation models", ExoCoffee, MPIA Heidelberg.

#### CONTRIBUTED TALKS

- 20 **Arjun Savel**, et al., 2026. Carnegie EPL, Washington, D.C. (upcoming)
- 19 **Arjun Savel**, et al., 2025. "Maximizing constraints from JWST transmission spectra with cross-correlation retrievals". CHEXO 12, STScI, Baltimore, MD
- 18 **Arjun Savel**, et al., 2025. "Leaving Flatland: Toward inferring the 3D structure of exoplanet atmospheres". FLASH Talk, UCSC, Santa Cruz, CA
- 17 **Arjun Savel**, et al., 2025. "Leaving Flatland: Toward inferring the 3D structure of exoplanet atmospheres". PALS Group Meeting, Berkeley, CA
- 16 **Arjun Savel**, et al., 2025. "Leaving Flatland: Toward inferring the 3D structure of exoplanet atmospheres". KIPAC Tea Talk, Stanford, Los Angeles, CA
- 15 **Arjun Savel**, et al., 2025. "Seeing in 3D: extracting spatial differences in exoplanet atmospheres with spectroscopy". Knutson Group, Caltech, Los Angeles, CA
- 14 **Arjun Savel**, Hayley Beltz, Thaddeus D. Komacek, Shang-Min Tsai, Eliza M.-R. Kempton, 2024. "A new lever on exoplanetary B fields: measuring heavy ion velocities". Stony Brook University Astronomy Seminar
- 13 **Arjun Savel**, Eliza M.-R. Kempton, Hayley Beltz, Thaddeus D. Komacek, 2024. "1D on 3D: Simulating the Impact of 3D Atmospheric Structure on 1D High-Resolution Inferences of Transmission Spectra". UMB's 46th Annual Graduate Research Conference, Baltimore
- 12 **Arjun Savel**, Eliza M.-R. Kempton, Hayley Beltz, Thaddeus D. Komacek, 2024. "1D on 3D: Simulating the Impact of 3D Atmospheric Structure on 1D High-Resolution Inferences of Transmission Spectra". UMD's 46th Annual Graduate Research Conference, University of Maryland, College Park
- 11 **Arjun Savel**, Eliza M.-R. Kempton, Hayley Beltz, Thaddeus D. Komacek, "1D on 3D: Simulating the Impact of 3D Atmospheric Structure on 1D High-Resolution Inferences of Transmission Spectra", 2024. Two HoRSEs, Berlin.
- 10 **Arjun Savel**, Megan Bedell, et al. 2024. "Lowering the memory cost of radiative transfer with *cortecs*." exoVAST seminar series.
- 9 **Arjun Savel**, Megan Bedell, et al. 2023. "Peering into the black box: the uncertainty budget of high-resolution spectroscopy of exoplanet atmospheres." Flatiron CCA Pre-doctoral Symposium, New York, NY.
- 8 **Arjun Savel**, Eliza M.-R. Kempton, et al. 2022. "Phase-resolved asymmetries of (ultra)hot Jupiters in high-resolution transmission: drivers and diagnostics", Flatiron Exoplanet Atmospheres Symposium, New York, NY.
- 7 **Arjun Savel**, Thaddeus Komacek, et al. 2022. "Modeling Lorentz drag in an ultra-hot Jupiter over a range of atmospheric parameters", Burgers Program Research Symposium on Environmental and Applied Fluid Dynamics, The George Washington University.
- 6 **Arjun Savel**, Eliza M.-R. Kempton, et al. 2022. "Phase-resolved asymmetries of (ultra)hot Jupiters in high-resolution transmission: drivers and diagnostics", Exoplanets IV, Las Vegas, CA.
- 5 **Arjun Savel**, Eliza M.-R. Kempton, et al. 2022. "Phase-resolved asymmetries of (ultra)hot Jupiters in high-resolution transmission: drivers and diagnostics", Bay Area Exoplanet Meeting #40, NASA Ames.
- 4 **Arjun Savel**, Eliza M.-R. Kempton, et al. 2021. "No umbrella needed: Confronting the hypothesis of iron rain on WASP-76b with post-processed general circulation models", Astronomy and Space Physics Seminar, University of Kansas.
- 3 **Arjun Savel**, Courtney D. Dressing, Lea Hirsch, David Ciardi, Jordan P.C. Fleming, Steven Giacalone, Andrew W. Mayo, Jessie L. Christiansen, 2019. "A Closer Look at Exoplanet Occurrence Rates: Considering the Multiplicity of Stars without Detected Planets", Bay Area Exoplanet Meeting #31, NASA Ames
- 2 **Arjun Savel**, Courtney D. Dressing, Lea Hirsch, David Ciardi, Jordan P.C. Fleming, Steven Giacalone, Andrew W. Mayo, Jessie L. Christiansen, 2019. "A Closer Look at Exoplanet Occurrence Rates: The Impact of Stars Without Exoplanets", Bay Area Planetary Sciences Meeting, Stanford University.
- 1 **Arjun Savel**, 2019. "Earth: Rare or Regular?", Undergraduate Seminars, UC Berkeley.

#### MISC. TECHNICAL TALKS

- 10 **Arjun Savel**, 2025. [Lecturer: Hi-res in the Desert](#). Tempe, Arizona.
- 9 **Arjun Savel**, 2024. "Ethical use of AI in astronomy," UMD, College Park.
- 8 **Arjun Savel**, 2024. "Scientific Writing," UMD, College Park.
- 7 **Arjun Savel**, 2023. "Preparing a CV," UMD, College Park.
- 6 **Arjun Savel**, 2023. "Scientific Writing," UMD, College Park.
- 5 **Arjun Savel**, 2023. "Undergraduate mentoring training," UMD, College Park.
- 4 **Arjun Savel**, 2022. "CI / CD," UMD, College Park.
- 3 **Arjun Savel**, 2022. "Giving a good presentation," UMD, College Park.
- 2 **Arjun Savel**, 2021. "Parallel Computing," UMD, College Park.

- 1 **Arjun Savel**, 2020. “CI / CD,” UC Berkeley.

## PUBLIC TALKS

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- 5 **Arjun Savel**. Maryland Science Cafe, Spring 2023 (**invited**).
- 4 **Arjun Savel**. STAR astronomy club, October 2022 (**invited**).
- 3 **Arjun Savel**. Gloucester Area Astronomy Club, January 2021 (**invited**).
- 2 **Arjun Savel**. Amateur Astronomers, Inc. December Meeting, 2020.
- 1 Courtney D. Dressing, Steven Giacalone, Andrew W. Mayo, **Arjun Savel**. Evening with the Stars, UC Berkeley, 2020.

## POSTERS

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- 14 **Arjun Savel**, Eliza M.-R. Kempton, et al. Cross-correlation for JWST, Exoclimes VII, 2025
- 13 **Arjun Savel**, Eliza M.-R. Kempton, Hayley Beltz, Thaddeus D. Komacek. Tracking fluid motions in exoplanet atmospheres with high-resolution spectroscopy, Brin MRC Tracer Mixing Summer School, 2024
- 12 **Arjun Savel**, Megan Bedell, Eliza M.-R. Kempton, Peter Smith, Jacob L. Bean, Michael R. Line, Kaze W.K. Wong, Lily Zhao. Peering into the black box: the uncertainty budget of high-resolution spectroscopy. Two HoRSEs, Berlin. 2024
- 11 Kenny Arnold, **Arjun Savel**, Eliza M.-R. Kempton, Michael Roman, Emily Rauscher, Isaac Malsky, Hayley Beltz. Diagnosing limb asymmetries in JWST transmission spectra: Insights from GCMs across the hot Jupiter population. Exoplanets V, Leiden, NL. 2024 (**presented on behalf of mentee**)
- 10 Kelle Cruz, David Rodriguez, William J. Cooper, **Savel, Arjun**. "The SIMPLE Archive: A collaboratively-curated database and website of low mass stars, brown dwarfs, and exoplanets". Extreme Solar Systems V, 2024.
- 9 **Arjun Savel** et al. Burgers Symposium, University of Maryland, College Park. 2023.
- 8 **Arjun Savel** et al. GMT Community Science Meeting, Washington, D.C., 2023.
- 7 **Arjun Savel** et al. Exoclimes VI, Exeter, UK. 2023.
- 6 Mayo, Andrew W.; Harada, Caleb; Dressing, Courtney; et al. (5 other coauthors, including **Arjun Savel**). “Enriching Our View of Multiplanet Systems Using TESS”. Exoplanets IV, 2022.
- 5 Rasmussen, Kaitlin C. ; Rahman, Fahin ; Beltz, Hayley ; Savel, Arjun ; et al. “Simulating the Exoplanet Atmosphere Detections of Today and Tomorrow with the All-Purpose Carrie Spectrograph Simulator”. Exoplanets IV, 2022.
- 4 **Arjun Savel**, Courtney D. Dressing, Lea Hirsch, David Ciardi, Jordan P.C. Fleming, Steven Giacalone, Andrew W. Mayo, Jessie L. Christiansen, 2020. “A closer look at planet occurrence rates: AO follow-up of 71 stars in the Kepler field”, AAS 235, Honolulu.
- 3 **Arjun Savel**, Courtney D. Dressing, Lea Hirsch, David Ciardi, Jordan P.C. Fleming, Jessie L. Christiansen, 2019. “A closer look: AO follow-up of 109 stars in the Kepler and K2 fields”, APSIS Poster Session, UC Berkeley.
- 2 Courtney D. Dressing, **Arjun Savel** et al. 2019. “Characterizing Planetary Systems Orbiting TESS Cool Dwarfs”, TESS Science Conference I, MIT.
- 1 Steven Giacalone, Courtney Dressing, **Arjun Savel**, 2019. “Validation of TESS Exoplanet Candidates”, 3rd Advanced School on Exoplanetary Science, Vietri sul Mare.

## RESEARCH MENTORING

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- Skye Joegriner (primarily advised by Dr. Will DeRocco), 2025  
*1-week workshop. Topic: the Ising model*
- Kenneth Ellis Arnold III, UMD, College Park (with Prof. Eliza M.-R. Kempton), now graduate student at UW Madison, 2022–2025  
*Modeling limb asymmetries of cloudy hot Jupiters*
- Holden Gill, UC Berkeley (with Prof. Courtney D. Dressing), 2020–2022  
*Ground-based imaging follow-up of K2 planet hosts*

## PEER MENTORING

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- Yash Gursahani, UMD, College Park, via Astro Grad Buddy Program, 2023
- Serena Cronin, UMD, College Park, via Astro Grad Buddy Program, 2021
- Lawrence Edmond IV, UC Berkeley, via Astronomy Buddy Program, 2019

## TEACHING EXPERIENCE

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- **Instructor of Record, Astronomy 288I (Introduction to the Astronomy Major)** *UMD College Park (Spring 2023)*  
 Designed lectures on career options in the field of astronomy, preparing websites, writing CVs, and networking. Organized panels on graduate school and industry.
- **Teaching Assistant, Astronomy 320 (Theoretical Astrophysics)** *UMD College Park, with Prof. Eliza Kempton (Spring 2023)*  
 Prepared review sessions and discussion problems. Topics spanned gravitation, fluids, and radiation.

- **Undergraduate Student Instructor, Astronomy C12 (The Planets)** *UC Berkeley, with Prof. Courtney D. Dressing and Prof. Raymond Jeanloz (Spring 2020)*  
Created review sessions for class with hundreds of students, created discussion problems and quizzes. Topics spanned geology and the Solar System.
- **Undergraduate Student Instructor, Astronomy C10 (Introduction to General Astronomy)** *UC Berkeley, with Alex Filippenko (Fall 2018, Fall 2019)*  
Designed review sessions for class with hundreds of students, created discussion problems and quizzes. Topics spanned the fundamentals of astronomy, stellar classification, exoplanets, and cosmology.

## COMMUNITY INVOLVEMENT

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- Pen Pal, Letters to a Pre-Scientist (2025–**present**)
- Judge, Long Island Science Fair Round 1 (2025–**present**)
- Distributed Peer Reviewer, ESO (2024–**present**)
- BANG! Seminar Organizing Committee, University of Maryland, College Park (2021, 2022, 2024)
- Graduate Prospective Visit Flash Talks Organizing Committee (2024)
- The Department Web Pages Committee, University of Maryland, College Park (2023–2025)
- Work-life balance panel, ASTR 680, University of Maryland, College Park (2023)
- Graduate Student Panel, ASTR 288I, University of Maryland, College Park (2023-2024)
- AstroTerps Graduate Student Research Panel, University of Maryland, College Park (2023)
- Astronomy Department Graduate Admissions Interviewer, University of Maryland, College Park (2023–2025)
- Graduate student website committee member, University of Maryland, College Park (2023–**present**)
- Lead author / maintainer: [High-resolution literature database](#) (2022–**present**)
- Graduation Gift Organizer, University of Maryland, College Park (2022–2023)
- GRAD-MAP Team Co-Lead, University of Maryland, College Park (2022–2025)
- Panelist: Carnegie EPL Summer Undergraduate Research Internship (SURI) Program’s graduate school workshop, University of Maryland, College Park (2022)
- Graduate Prospective Visit Meals Planning (2022-2023)
- “Hot Papers” journal club organizer, University of Maryland, College Park (2020–2022)
- Equity, Diversity, and Inclusion Committee, University of Maryland, College Park (2020–2022)
- GRAD-MAP Team Member, University of Maryland, College Park (2020–2022)
- Public Liaison for Prof. Alex Filippenko (2019–2022)
- Undergraduate Representative, Astronomy Department, UC Berkeley (2019-2020)
- Mentor, Berkeley Astronomy Scholars Program (2019-20)
- Director of Physics and Astronomy, Undergraduate Lab at Berkeley (ULAB) (2018-2019)
- Night Editor, The Daily Californian (2017)

## JOURNAL REVIEWING

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- Astronomy and Astrophysics (2024–**present**): 1 paper reviewed
- AAS Journals (2024–**present**): 1 paper reviewed
- Journal of Open Source Software (2020–**present**): 7 projects reviewed

## WORKSHOPS & CONFERENCES

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- [Hi-res in the Desert](#). Tempe, Arizona (2025)
- [Exoclimes VII](#), Montreal, Canada (2025)
- [AGU](#), Washington, D.C. (2024)
- [Brin MRC Tracer Mixing Summer School](#) (2024, first three days)
- UMB’s 46th Annual Graduate Research Conference, Baltimore (2024)
- [Two HoRSEs](#), Berlin, DE (2024)
- Exoplanets V, Leiden, NL (2024)
- GMT Community Science Meeting, Washington, D.C. (2023)
- Exoclimes VI, Exeter, UK (2023)
- [Flatiron-wide Algorithms and Mathematics](#), New York (2022)

- Building Bridges Across Planet-Related Science, Baltimore (2022, 2023)
- [Flatiron Exoplanet Atmospheres Symposium](#), New York (2022)
- Burgers Program Research Symposium on Environmental and Applied Fluid Dynamics (2022, 2023)
- Exoplanets IV, Las Vegas (2022)
- Chesapeake Bay Area Exoplanet Meeting, virtual (Spring 2021)
- Exoplanet atmosphere characterization: from HST and Spitzer to JWST (2021)
- JWST Master Class Workshop, Stanford University (2020)
- AAS Winter Meeting, Honolulu (2020)
- Bay Area Exoplanet Meeting, NASA Ames (Spring 2019, Winter 2019, Spring 2020, Spring 2022)
- Bay Area Planetary Science Meeting, Stanford University (2019)

## PROFESSIONAL AFFILIATIONS

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American Astronomical Society

The [AETHER](#) Collaboration

The JWST Transiting Exoplanet Collaboration ERS program ([JTEC](#))

## SKILLS

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- **Programming / Markup Languages:** Python, ADQL/SQL, R, C, HTML, JavaScript, Swift,  $\text{\LaTeX}$
- **Supercomputing Clusters:** *deephought2* and *zaratan* at UMD, College Park; *moria* at MSU; *rusty* at Flatiron CCA; *TIKE* at MAST
- **Frameworks / Tools:** git, Slurm, Numba, JAX, SciPy, Pandas, React, Dask
- **Misc. Skills:** Radiative transfer, open-source code management, optimization, web development / automation, copy editing
- **Languages:** English (fluent), Spanish (moderate written, basic spoken), Hindi (basic written, basic spoken)