Arjun B. Savel

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Education

University of Maryland, College Park — College Park, MD
Ph.D., Astronomy — *Expected*
M.S., Astronomy | Advisor: Prof. Eliza M.-R. Kempton — *2022, Expected*

University of California, Berkeley — Berkeley, CA
B.A., Astrophysics; B.A., Physics | Advisor: Asst. Prof. Courtney D. Dressing — *2020*

Positions

Pre-doctoral fellow—Center for Computational Astrophysics, Flatiron Institute — New York, NY
Data-driven tellurics treatment in high-resolution spectroscopy of exoplanet atmospheres | Mentor: Dr. Megan Bedell — *2022–current*

Consultant—ScienceBetter Consulting — New York, NY
Tutorial Jupyter notebooks for MAST science cases | Manager: Prof. Kelle Cruz — *2022*

Graduate Researcher—University of Maryland, College Park — College Park, MD
Three-dimensionality in high-resolution transmission spectra of ultra-hot Jupiters | Advisor: Prof. Eliza M.-R. Kempton — *2020–current*

Research Assistant—University of California, Berkeley — Berkeley, CA
Exoplanet occurrence rates and ground-based imaging follow-up of Kepler stars | Advisor: Asst. Prof. Courtney D. Dressing — *2018–2020*

Selected & Current Research Interests

- Extracting 3-D information (wind, chemical, aerosol, and thermal structures) from exoplanet atmospheres
- Improving high-resolution cross-correlation spectroscopy techniques
- Distinguishing between equilibrium and disequilibrium chemistry in exoplanet atmospheres
- Modeling time-independent magnetohydrodynamics in hot planet atmospheres
- Characterizing exoplanetary systems and host stars

Publications

citations: 210 / h-index: 8 / 2 first-author refereed, 2 under review (2022-12-02)

Refereed Publications

16 Beltz, Hayley; Rauscher, Emily; Kempton, Eliza M. -R.; Malsky, Isaac; *et al.* (3 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) [2 citations]

15 Newton, Elisabeth R.; Rampalli, Rayna; Kraus, Adam L.; Mann, Andrew W.; *et al.* (35 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) [2 citations]

14 Gandhi, Siddharth; Kesseli, Aurora; Snellen, Ignas; Brogi, Matteo; *et al.* (4 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) [1 citation]

13 Yee, Samuel W.; Winn, Joshua N.; Hartman, Joel D.; Rodriguez, Joseph E.; *et al.* (68 other co-authors, incl. **Savel, Arjun**), 2022, *The TESS Grand Unified Hot Jupiter Survey. I. Ten TESS Planets*, AJ, 164, 70 (arXiv:2205.09728) [2 citations]

12 Gan, Tianjun; Soubkiou, Abderahmane; Wang, Sharon X.; Benkhaldoun, Zouhair; *et al.* (62 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) [6 citations]

11 Murakami, Yukei S.; Jennings, Connor; Hoffman, Andrew M.; **Savel, Arjun**; *et al.*, 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) [1 citation]

10 Giacalone, Steven; Dressing, Courtney D.; Hedges, Christina; Kostov, Veselin B.; *et al.* (107 other co-authors, incl. **Savel, Arjun**), 2022, *Validation of 13 Hot and Potentially Terrestrial TESS Planets*, AJ, 163, 99 (arXiv:2201.12661) [3 citations]

9 Dong, Jiayin; Huang, Chelsea X.; Zhou, George; Dawson, Rebekah I.; *et al.* (55 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) [6 citations]

8 **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) [14 citations]

7 de Leon, J. P.; Livingston, J.; Endl, M.; Cochran, W. D.; *et al.* (23 other co-authors, incl. **Savel, Arjun**), 2021, *37 new validated planets in overlapping K2 campaigns*, MNRAS, 508, 195 (arXiv:2108.05621) [10 citations]

6 May, Erin M.; Komacek, Thaddeus D.; Stevenson, Kevin B.; Kempton, Eliza M. -R.; *et al.* (14 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) [16 citations]

5 Cloutier, Ryan; Charbonneau, David; Stassun, Keivan G.; Murgas, Felipe; *et al.* (62 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) [15 citations]

4 Foreman-Mackey, Daniel; Luger, Rodrigo; Agol, Eric; Barclay, Thomas; *et al.* (12 other co-authors, incl. **Savel, Arjun**), 2021, *exoplanet: Gradient-based probabilistic inference for exoplanet data & other astronomical time series*, The Journal of Open Source Software, 6, 3285 (arXiv:2105.01994) [56 citations]

3 Rodriguez, Joseph E.; Quinn, Samuel N.; Zhou, George; Vanderburg, Andrew; *et al.* (114 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) [21 citations]

2 **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) [18 citations]

1 Demory, B. -O.; Pozuelos, F. J.; Gómez Maqueo Chew, Y.; Sabin, L.; *et al.* (69 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) [34 citations]

Under Review

4 **Savel, Arjun** *et al.* 2022, *Diagnosing limb asymmetries in hot and ultra-hot Jupiters with high-resolution transmission spectroscopy*, submitted

3 **Savel, Arjun** *et al.* 2022, *Data reduction paper*, accepted, PASP

2 Lillo-Box, J.; Gandolfi, D.; Armstrong, D. J.; Collins, K. A.; *et al.* (59 other co-authors, incl. **Savel, Arjun**), 2022, *TOI-969: a late-K dwarf with a hot mini-Neptune in the desert and an eccentric cold Jupiter*, ArXiv (arXiv:2210.08996)

1 Rodriguez, Joseph E.; Quinn, Samuel N.; Vanderburg, Andrew; Zhou, George; *et al.* (117 other co-authors, incl. **Savel, Arjun**), 2022, *Another Shipment of Six Short-Period Giant Planets from TESS*, ArXiv (arXiv:2205.05709) [3 citations]

Selected Honors, Prizes, & Awards

- CCA Pre-Doctoral Fellowship, Flatiron Institute Center for Computational Astrophysics (2022)
- Gregor and Donat Wentzel Scholarship, University of Maryland (2020)
- Student commencement speaker, UC Berkeley Astronomy Department (2020)
- Chambliss Astronomy Achievement Award Student Prize, AAS 235 (2020)
- Outstanding Graduate Student Instructor Award, UC Berkeley (2020)
- 1st place, Astronomy Poster Summer Intern Symposium, UC Berkeley (2019)
- Student Technology Fund grant for ULAB, UC Berkeley (2018)
- Ongoing Physics Department award for ULAB, UC Berkeley (2018)

Science Talks

10 **Arjun Savel**, 2022. "Phase-resolved asymmetries of (ultra)hot Jupiters in high-resolution transmission: drivers and diagnostics", Flatiron Exoplanet Atmospheres Symposium, New York, NY.

9 **Arjun Savel**, 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.

8 **Arjun Savel**, 2022. "Phase-resolved asymmetries of (ultra)hot Jupiters in high-resolution transmission: drivers and diagnostics", Exoplanets IV, Las Vegas, CA.

7 **Arjun Savel**, 2022. "Phase-resolved asymmetries of (ultra)hot Jupiters in high-resolution transmission: drivers and diagnostics", Bay Area Exoplanet Meeting #40, NASA Ames.

6 **Arjun Savel**, 2021. "No umbrella needed: Confronting the hypothesis of iron rain on WASP-76b with post-processed general circulation models", ExoCoffee, MPIA Heidelberg (**invited**).

5 **Arjun Savel**, 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.

4 Courtney D. Dressing, Steven Giacalone, Ellianna S. Abrahams *et al.* (7 other co-authors, incl. **Arjun Savel**), 2020. "Using TESS to Investigate the Frequency of Planetary Systems Orbiting Cool Dwarfs", AAS 235, Honolulu.

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.

Posters

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 Stession, 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 Advising

Kenneth Ellis Arnold, UMD College Park (with Prof. Eliza M.-R. Kempton), 2022–present
Holden Gill, UC Berkeley (with Asst. Prof. Courtney D. Dressing), 2020–present

Public Talks

4 **Arjun Savel**. STAR astronomy club, October 2022.

3 **Arjun Savel**. Gloucester Area Astronomy Club, January 2021.

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.

Observing Experience

3-meter Shane Telescope (ShARCS): assisted with 14.5 nights (Mt. Hamilton, CA)
10-meter Keck Telescope (NIRC2): assisted with 1/2 night (Mauna Kea, HI)
10-meter Keck Telescope (NIRSPEC): assisted with 1/2 night (Mauna Kea, HI)

Teaching Experience

Undergraduate Student Instructor, Astronomy C12 (The Planets): UC Berkeley, with Courtney D. Dressing and Raymond Jeanloz (2020)
Undergraduate Student Instructor, Astronomy C10 (Introduction to General Astronomy): UC Berkeley, with Alex Filippenko (2018-19)

Community Involvement

- Lead author / maintainer: High-resolution literature database (2022–present)
- Graduation Gift Organizer, University of Maryland, College Park (2022–present)
- Panelist: Carnegie EPL Summer Undergraduate Research Internship (SURI) Program's graduate school workshop (2022)
- GRAD-MAP Team Co-Lead, University of Maryland, College Park (2022–present)
- BANG! Seminar Organizing Committee, University of Maryland, College Park (2021–2022)
- Peer mentor, University of Maryland, College Park (2021–2022)
- "Hot Papers" journal club organizer, University of Maryland, College Park (2020–2022)
- Reviewer, Journal of Open Source Software (3 projects reviewed) (2020–present)
- Equity, Diversity, and Inclusion Committee, University of Maryland, College Park (2020–2022)
- GRAD-MAP Team Member, University of Maryland, College Park (2020–2022)
- Mentor, TARDIS Google Summer of Code (2020)
- Public Liaison for Prof. Alex Filippenko (2019–present)
- Undergraduate Representative, Astronomy Department, UC Berkeley (2019-20)
- Mentor, Berkeley Astronomy Scholars Program (2019-20)
- Director of Physics and Astronomy, Undergraduate Lab at Berkeley (ULAB) (2018-19)
- Night Editor, The Daily Californian (2017)

References available upon request. Last updated: 2022-12-03. CV version tag linked here.

Workshops & Conferences

- Flatiron-wide Algorithms and Mathematics (2022)
- Building Bridges Across Planet-Related Science (2022)
- Flatiron Exoplanet Atmospheres Symposium (2022)
- Burgers Program Research Symposium on Environmental and Applied Fluid Dynamics (2022)
- Exoplanets IV (2022)
- Chesapeake Bay Area Exoplanet Meeting (Spring 2021)
- Exoplanet atmosphere characterization: from HST and Spitzer to JWST (2021)
- JWST Master Class Workshop, Stanford University (2020)
- AAS Winter Meeting (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

American Astronomical Society
The AEThER Collaboration

Skills & Assets

- **Programming / Markup Languages**: Python, ADQL/SQL, R, C, HTML, JavaScript, LaTeX
- **Supercomputing Clusters**: *deepthought2* and *zaratan* at UMD, College Park; *moria* at MSU; *rusty* at Flatiron CCA
- **Frameworks / Tools**: git, Slurm, Numba, JAX, SciPy, Pandas, React
- **Misc. Skills**: MCMC, neural networks, astronomical image reduction, radiative transfer, open-source code management, optimization, web development / automation, copy editing
- **Languages**: English (fluent), Spanish (conversational), Hindi (basic)