Stella Koch Ocker

Curriculum Vitae

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Citizenship: USA, Germany

Education

Cornell University — Ithaca, NY
M.S., Ph.D. in Astronomy — August 2023 (planned)
Advisor: Prof. James Cordes
Thesis Title: "Probing Extreme Astrophysical Phenomena with Plasma Near and Far"

Oberlin College — Oberlin, OH
B.A. with High Honors in Physics (Concentration in Astrophysics) — 2018

Research Interests

- Interstellar, circumgalactic, & intergalactic media
- Energetic transients and compact objects, including fast radio bursts & pulsars
- Precision pulsar timing & its applications: gravitational wave detection & General Relativity

Scholarships, Grants, and Awards

- Carnegie-Caltech Brinson Prize Fellowship — 2023–
- NASA Outer Heliosphere Guest Investigator Grant — 2020–2023
- Outstanding Student Presentation Award, American Geophysical Union Fall Meeting — 2022
- International Astronomical Union & Heising-Simons Foundation Travel Grant — 2022
- Cranson & Edna Shelley Graduate Research Award, Cornell University — 2021
- Prize for Highest Scientific Merit, Cornell KK Wang Space Tech Poster Competition — 2021
- Cranson & Edna Shelley Outstanding Teaching Assistant Award, Cornell University — 2020
- Honorable Mention, NSF Graduate Research Fellowship Competition — 2020
- Graduate Student Fellowship, Cornell University — 2018–2019
- Carl E. Howe Prize in Physics, Oberlin College — 2018
- Oberlin Physics & Astronomy Department Honors Program — 2017–2018
- Robert Weinstock Prize for Outstanding Achievement in Physics Coursework (Oberlin) — 2017
- John Frederick Oberlin Merit Scholarship — 2014–2018

Refereed Publications

1. **Ocker SK**, Cordes JM, Chatterjee S, Li D, Niu CH, McKee JW, Law CJ, Anna-Thomas R. "Scattering variability detected from the circumsource medium of FRB 20190520B." *MNRAS* 519:821. February, 2023. doi:10.1093/mnras/stac3547
2. **Ocker SK**, Cordes JM, Chatterjee S, Gorsuch M. "Radio scattering horizons for interstellar and extragalactic transients." *ApJ* 934:71. July, 2022. doi:10.3847/1538-4357/ac75ba
3. **Ocker SK**, Cordes JM, Chatterjee S, Niu CH, Li D, McKee JW, Law CJ, Tsai CW, Anna-Thomas R, Yao JM, Cruces M. "The large dispersion and scattering of FRB 20190520B are dominated by the host galaxy." *ApJ* 931:87. May, 2022. doi:10.3847/1538-4357/ac6504
4. **Ocker SK**, Cordes JM, Chatterjee S, Dolch T. "An in situ study of turbulence near stellar bow shocks." *ApJ* 922:233. December, 2021. doi:10.3847/1538-4357/ac2b28

5. **Ocker SK**, Cordes JM, Chatterjee S, Gurnett D, Kurth B, Spangler S. "Persistent plasma waves in interstellar space detected by Voyager 1." *Nature Astronomy* 5, 761-765. May, 2021. doi:10.1038/s41550-021-01363-7
6. **Ocker SK**, Cordes JM, Chatterjee S. "Constraining galaxy haloes from the dispersion and scattering of fast radio bursts and pulsars." *ApJ* 911:2. April, 2021. doi:10.3847/1538-4357/abeb6e
7. **Ocker SK**, Cordes JM, Chatterjee S. "Electron density structure of the local Galactic disk." *ApJ* 897:2. July, 2020. doi:10.3847/1538-4357/ab98f9
8. **Ocker SK**, Petrie G. "The effects of spatial smoothing on solar magnetic helicity parameters and the hemispheric helicity sign rule." *ApJ*. 832:162. November, 2016. doi:10.3847/0004-637X/832/2/162

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9. Falxa M, Babak S, Baker PT, ..., **Ocker SK** et al. "Searching for continuous gravitational waves in the second data release of the International Pulsar Timing Array." Accepted to *MNRAS*. doi:10.1093/mnras/stad812.
10. NANOGrav Collaboration. "The NANOGrav 12.5 year data set: Bayesian limits on gravitational waves from individual supermassive black hole binaries." Under review at *ApJ*. arXiv:2301.03608.
11. Anna-Thomas R, Burke-Spolaor S, ... **Ocker SK** et al. "A highly variable magnetized environment in a fast radio burst source." Under review at *Science*. arXiv:2202.11112
12. Stinebring DR, Rickett BJ, Minter AH, Hill AS, Jussila AP, Mathis L, McLaughlin MA, **Ocker SK**, Ransom SM. "A scintillation arc survey of 22 pulsars with low to moderate dispersion measures." *ApJ* 941:34. December, 2022. doi:10.3847/1538-4357/ac8ea8
13. Niu CH, Li D, ..., **Ocker SK** et al. "A repeating fast radio burst in a dense environment with a compact persistent radio source." *Nature* 606, 873877. June, 2022. doi:10.1038/s41586-022-04755-5
14. Cordes JM, **Ocker SK**, Chatterjee S. "Redshift estimation and constraints on intergalactic and interstellar media from dispersion and scattering of fast radio bursts." *ApJ* 931:88. May, 2022. doi:10.3847/1538-4357/ac6873
15. Stinebring DR, Rickett BJ, **Ocker SK**. "The frequency dependence of scintillation arc thickness in pulsar B1133+16." *ApJ* 870:2. January, 2019. doi:10.3847/1538-4357/aaef80

Non-Refereed Publications

Ocker SK, Cordes JM, Chatterjee S, Hazboun J, Dolch T, Stinebring D, Madison D, White S, Taylor G, Lewandowska N, Lam M. "Heliosphere meets interstellar medium, in a Galactic context." White paper submitted to the National Academies Heliophysics 2024 Decadal Survey. August, 2022. arXiv:2208.11804

Affiliations

- North American Nanohertz Observatory for Gravitational Waves (NANOGrav) 2019–current
- NASA Guest Investigator: *Voyager Interstellar Mission* 2020–2023
- American Astronomical Society (AAS) 2018–current

Telescope Time Allocations (PI: Ocker)

- Green Bank Telescope: Rank A (16.5 hours) 2023A
  Title: "An Ultra-Wideband Study of Repeating Fast Radio Bursts"
- Five-hundred-meter Aperture Spherical Telescope: Rank A (17.3 hours) 2021
  Title: "A Search for Pulsar Bow Shocks Using Interstellar Scintillations"

Teaching

- **Head Teaching Assistant** at Cornell University — Spring 2020
  Our Solar System (ASTRO 1102/1104)
- **Teaching Assistant** at Cornell University — Fall 2019
  From New Worlds to Black Holes (ASTRO 1101/1103)
- **Teaching Assistant** at Oberlin College — 2016–2017
  Electricity, Magnetism, & Thermodynamics (PHYS 111)
  Mechanics & Relativity (PHYS 110)

Mentoring

Research Experiences for Undergraduates, Cornell University

Mentee: Taite Ellenson, Cornell University — *2022*
Mentee: Miranda Gorsuch, University of Wisconsin Stevens Point — *2021*
Mentee: Samantha Rosenfeld, Union College — *2020*

Invited Talks

1. Physics & Astronomy Colloquium, Oberlin College (2023).
2. Special Session SH22C (*Interstellar Probe*), American Geophysical Union Conference (2022).
3. "There's Plenty of Room at the Bottom" FRB Meeting, Cornell University (2022).
4. Colloquium, CSIRO Australia National Telescope Facility (2022).
5. Scintillometry Workshop, University of Toronto (2022).
6. Breaking News Session, International Astronomical Union General Assembly Symposium: The Dawn of Cosmology & Multi-Messenger Studies with Fast Radio Bursts (2022).
7. Diffuse Ionized Gas Seminar, University of Washington, Seattle (2022).
8. FRB Seminar, Academia Sinica Institute of Astronomy and Astrophysics (ASIAA), Taiwan (2022).
9. Radio/mm/sub-mm Seminar, Caltech (2022).
10. Colloquium, Green Bank Observatory (2021).
11. *Interstellar Probe* Workshop, Applied Physics Laboratory, Johns Hopkins University (2021).
12. Colloquium, Netherlands Institute for Radio Astronomy (ASTRON/JIVe; 2021).
13. CHIME/FRB Collaboration Journal Club (2021).

Contributed Talks and Posters

1. Mapping Small-Scale Structure in the ISM from Voyager to Nearby Pulsars. Talk. Spring Meeting of the Voyager Interstellar Mission Science Steering Group (2023).
2. A Search for Scintillation from Pulsar Bow Shocks. Talk. NANOGrav Spring Meeting (2023).
3. Noise Considerations for Pulsar Science with DSA-2000. Scientific Frontiers and Synergies with the DSA-2000 Radio Camera. Poster. California Institute of Technology (2023).
4. Bow Shocks of Scintillating Pulsars. Talk. Scintillometry Workshop, University of Toronto (2022).
5. Scattering Horizons for Fast Radio Bursts. Talk. International Astronomical Union General Assembly; Symposium: The Dawn of Cosmology & Multi-Messenger Studies with Fast Radio Bursts (2022).
6. Mapping the Local ISM From Voyager to Pulsars. Talk. Spring Meeting of the Voyager Interstellar Mission Science Steering Group (2022)

7. Scattering Horizons for Pulsars and Fast Radio Bursts. Poster. NANOGrav Spring Meeting (2022).
8. An In Situ Study of Turbulence Near Stellar Bow Shocks. Talk. NANOGrav Fall Meeting (2021)
9. Turbulence Near Stellar Bow Shocks. Talk. Fall Meeting of the Voyager Interstellar Mission Science Steering Group (2021)
10. Interstellar Propagation Effects Near and Far. Talk. NANOGrav Spring Meeting (2021)
11. Voyager 1 Is Now an Interstellar Probe. Poster. KK Wang Cornell Space Tech Industry Day (2021)
12. Voyager 1 Detects Persistent Plasma Waves in Interstellar Space. Talk. Spring Meeting of the Voyager Interstellar Mission Science Steering Group (2021)
13. Interstellar Turbulence Near the Heliospheric Boundary. Talk. Fall Meeting of the Voyager Interstellar Mission Science Steering Group (2020)
14. Assessing Chromatic Arrival Time Perturbations for NANOGrav's Error Budget. Poster. 235th AAS Meeting (2020)
15. Multi-Frequency Scintillation Arc Study of Pulsar B1133+16. Poster. 233rd AAS Meeting (2019)
16. Multiple scintillation arcs in a nearby pulsar, B1133+16: crucial clues? Talk. Scintillometry Workshop, University of Toronto (2017)
17. The effects of spatial smoothing on solar magnetic helicity and the hemispheric helicity sign rule. Poster. 47th AAS/Solar Physics Division Meeting (2016)

Professional Service

- **Referee** 2021–current
  MNRAS, ApJ
- **NANOGrav Climate & Equity Committee Member** 2021–current
  Contributor to NANOGrav Diversity Plan, annual climate survey
- **Peer Mentor Coordinator, Cornell Astronomy Graduate Network** 2021–2022
  Paired graduate student mentors and mentees; trained mentors; led group mentoring sessions
- **President, Cornell Astronomy Graduate Network** 2020–2021
  Contributed to creation of Cornell Astronomy Graduate Student Handbook and the Astronomy Peer Mentoring Network; facilitated #Strike4BlackLives event
- **Secretary & Outreach Coordinator, Cornell Astronomy Graduate Network** 2019–2020
  Organized the weekly graduate student and post-doc seminar; lead organizer of outreach events involving graduate students (see Outreach section below)
- **Student Representative, Oberlin College Department of Physics & Astronomy** 2016–2018
  Attended all faculty meetings; led student committee for 2017 faculty search; organized weekly Women/Trans/Nonbinary in Physics Tea

Outreach

- Public Talk, Cornell Astronomical Society 2023
- Contributing Writer, Ask an Astronomer: curious.astro.cornell.edu 2018–2023
- Public Talk, Southern Maine Astronomers Organization 2022
- Workshop Leader, Expanding Your Horizons, Cornell University 2019, 2021-2022
- Organizer, Museum in the Dark Event, Museum of the Earth, Ithaca NY 2019-2020
- Program Leader, 4-H Career Explorations, Cornell University 2019

Selected Media Interviews

- Vice News: “Flying 15 Billion Miles Away from Earth” youtube.com
- NPR: “If NASA green lights this interstellar mission, it could last 100 years” npr.org
- NPR Short Wave Podcast: “Planning for a space mission to last more than 50 years” npr.org
- WKMG News 6 Space Curious Podcast: “How Big is the Solar System?” podcasts.apple.com
- NBC: “NASA spacecraft detects a constant ‘hum’ deep in the cosmos” nbcnews.com
- Gizmodo: “NASA’s Voyager 1 Probe Detects the Steady ‘Hum’...” gizmodo.com
- NASA: “Voyager 1’s Density Measurements are Making Waves” nasa.gov
- AASNova: “What Fast Radio Bursts Tell Us About Galaxy Halos” aasnova.org