

Stella Koch Ocker

Curriculum Vitae

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EDUCATION

Cornell University M.S., Ph.D. in Astronomy (Advisor: Prof. James M. Cordes)	Ithaca, NY 2018–2023 (planned)
Oberlin College B.A. with High Honors in Physics (Concentration in Astrophysics)	Oberlin, OH 2014–2018

RESEARCH INTERESTS

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

SCHOLARSHIPS, GRANTS, AND AWARDS

• NASA Outer Heliosphere Guest Investigator Grant	2020–2023
• International Astronomical Union & Heising-Simons Foundation Travel Grant	2022
• Cranson & Edna Shelley Graduate Research Award, Cornell University	2021
• Prize for Highest Scientific Merit, KK Wang Space Tech Poster Competition, Cornell University	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 College	2017
• John Frederick Oberlin Merit Scholarship	2014–2018

PUBLICATIONS

Lead Author:

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.” Under review at *MNRAS*. arXiv:2210.01975
2. **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
3. **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
4. **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
5. **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
6. **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
7. **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
8. **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
9. **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

Contributing Author:

1. Anna-Thomas R, Burke-Spolaor S, ... **Ocker SK** et al. “Magnetic Field Switching in a Turbulent Fast Radio Burst Environment.” Under review at *Science*.
2. 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.” Accepted to *ApJ*. arXiv:2207.08756
3. 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

4. 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
5. 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

INVITED TALKS

11 invited talks: 3 national observatory colloquia, 3 research university colloquia and seminars, 2 major conferences, 2 specialized conferences

1. Unveiling the Ionized Interstellar Medium with Interstellar Probe. American Geophysical Union Special Session SH22C (2022).
2. Scattering Horizons for Fast Radio Bursts. CSIRO/ATNF Colloquium (2022).
3. Scattering Variations Detected from a Repeating Fast Radio Burst. Scintillometry Workshop, University of Toronto (2022).
4. Scattering Variations Detected from a Repeating Fast Radio Burst. Breaking news session, International Astronomical Union General Assembly Symposium: The Dawn of Cosmology & Multi-Messenger Studies with (2022).
5. Scattering Horizons for Extragalactic Fast Radio Bursts. University of Washington, Seattle (2022).
6. The Large Dispersion and Scattering of FRB 20190520B Are Dominated by the Host Galaxy. ASIAA FRB Meeting (2022).
7. Scattering Horizons for Fast Radio Transients. Radio/mm/sub-mm Seminar, Caltech (2022).
8. Exploring the Interstellar Medium from Voyager to Pulsars. Green Bank Observatory Colloquium (2021)
9. Voyager 1 Detects Persistent Plasma Waves in Interstellar Space. Interstellar Probe Workshop, Applied Physics Laboratory (2021)
10. Probing the Local ISM on Sub-AU Scales with Voyager. ASTRON/JIVE Colloquium (2021)
11. Constraining Galaxy Haloes from the Dispersion and Scattering of Fast Radio Bursts. CHIME/FRB Collaboration Journal Club (2021)

CONTRIBUTED TALKS AND POSTERS

14 total contributed conference talks and posters, including 4 Voyager Interstellar Mission Science Steering Group Meetings and 3 NANOGrav Collaboration Meetings (not shown).

1. Bow Shocks of Scintillating Pulsars. Talk. Scintillometry Workshop, University of Toronto (2022).

2. 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).
3. Voyager 1 Is Now an Interstellar Probe. Poster. KK Wang Cornell Space Tech Industry Day (2021)
4. Assessing Chromatic Arrival Time Perturbations for NANOGrav's Error Budget. Poster. 235th AAS Meeting (2020)
5. Multi-Frequency Scintillation Arc Study of Pulsar B1133+16. Poster. 233rd AAS Meeting (2019)
6. Multiple scintillation arcs in a nearby pulsar, B1133+16: crucial clues? Talk. Scintillometry Workshop, University of Toronto (2017)
7. The effects of spatial smoothing on solar magnetic helicity and the hemispheric helicity sign rule. Poster. 47th AAS/Solar Physics Division Meeting (2016)

AFFILIATIONS

- Full Member, North American Nanohertz Observatory for Gravitational Waves (NANOGrav) 2021–current
- NASA Outer Heliosphere Guest Investigator, Voyager Interstellar Mission 2020–current
- Associate Member, NANOGrav 2019–2021
- Carl Sagan Institute, Cornell University 2020–current
- Cornell Center for Astrophysics and Planetary Science 2018–current
- Graduate Student Member, American Astronomical Society (AAS) 2018–current

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 Spring 2017
Electricity, Magnetism, & Thermodynamics (PHYS 111)
- **Teaching Assistant** at Oberlin College Fall 2016
Mechanics & Relativity (PHYS 110)
- **Tutor** at Oberlin College 2015–2016
Quantitative Skills Center

MENTORING

Research Experiences for Undergraduates, Cornell University

<i>Mentee: Taite Ellenson, Cornell University</i>	2022
<i>Mentee: Miranda Gorsuch, University of Wisconsin Stevens Point</i>	2021
<i>Mentee: Samantha Rosenfeld, Union College</i>	2020

PROFESSIONAL SERVICE

- **Referee** 2021–
MNRAS, ApJ
- **NANOGrav Climate & Equity Committee Member** 2021–
Contributor to NANOGrav Diversity Plan, annual climate survey
- **Peer Mentor Coordinator, Cornell Astronomy Graduate Network** 2021–2022
Paired graduate student mentors and mentees; conducted mentor trainings; organized group mentoring sessions
- **President, Cornell Astronomy Graduate Network** 2020–2021
Contributed to creation of Cornell Astronomy Graduate Student Handbook and the Astronomy Graduate Peer Mentoring Network; facilitated #Strike4BlackLives event; created virtual outreach event for Expanding Your Horizons
- **Secretary & Outreach Coordinator, Cornell Astronomy Graduate Network** 2019–2020
Organized the weekly graduate student and post-doc seminar; lead organizer of all outreach events involving graduate students; coordinated graduate student lectures at Ithaca public libraries
- **Student Representative, Oberlin College Department of Physics & Astronomy** Fall 2016–Spring 2018
Attended all faculty meetings; led student committee for 2017 faculty search; organized Women/Trans/Nonbinary in Physics Tea; organized annual departmental t-shirt contest; awarded Carl E. Howe Prize in Physics for service as student representative

OUTREACH

- Public Talk, Southern Maine Astronomers Organization July 2022
- Workshop Leader, Expanding Your Horizons, Cornell University 2021 - 2022
- Programming Workshop Leader, Research Experiences for Undergraduates, Cornell University June 2021
- Volunteer, Museum in the Dark, Museum of the Earth, Ithaca NY October 2020
- Lead Organizer, Museum in the Dark, Museum of the Earth, Ithaca NY October 2019
- Organizer, Cornell STEP Astronomy program July 2019

- Program Leader, 4-H Career Explorations, Cornell University June 2019
- Coordinator, Kids' Science Day at the Big Red Barn, Cornell University May 2019
- Volunteer, Expanding Your Horizons, Cornell University April 2019

SELECTED MEDIA INTERVIEWS

- Vice News/Motherboard Space Show: "Flying 15 Billion Miles Away from Earth" [youtube.com](https://www.youtube.com/watch?v=...)
- **NPR**: "If NASA green lights this interstellar mission, it could last 100 years" [npr.org](https://www.npr.org/...)
- **NPR** Short Wave Podcast: "Planning for a space mission to last more than 50 years" [npr.org](https://www.npr.org/...)
- Ask an Astronomer: "Earth's Bow Shock" [curious.astro.cornell.edu](https://curious.astro.cornell.edu/...)
- WKMG News 6 Space Curious Podcast: "How Big is the Solar System?" [clickorlando.com](https://www.clickorlando.com/...)
- **NBC**: "NASA spacecraft detects a constant 'hum' deep in the cosmos" [nbcnews.com](https://www.nbcnews.com/...)
- Gizmodo: "NASA's Voyager 1 Probe Detects the Steady 'Hum' of Plasma in Interstellar Space" [gizmodo.com](https://www.gizmodo.com/...)
- **NASA**: "Voyager 1's Density Measurements are Making Waves" [nasa.gov](https://www.nasa.gov/...)
- Cornell Chronicle: "In the emptiness of space, Voyager 1 detects plasma 'hum'" [news.cornell.edu](https://news.cornell.edu/...)
- AASNova: "What Fast Radio Bursts Tell Us About Galaxy Halos" [aasnova.org](https://aasnova.org/...)