

EDUCATION

Cornell University Ph.D. in Astronomy, Advisor: Prof. James Cordes	Ithaca, NY 2020–Current
Cornell University M.S. in Astronomy, Advisor: Prof. James Cordes	Ithaca, NY 2018–2020
Oberlin College B.A. with High Honors in Physics – Concentration: Astrophysics – Minor: English	Oberlin, OH 2014–2018

RESEARCH INTERESTS

- Radio transients, including fast radio bursts and pulsars
- Precision pulsar timing and its applications, including gravitational wave detection and tests of General Relativity
- The interstellar medium, including plasma turbulence and radio wave propagation

SCHOLARSHIPS, GRANTS, AND AWARDS

• Cranson & Edna Shelley Graduate Research Award, Cornell University	2021
• Prize for Highest Scientific Merit, KK Wang Space Tech Poster Competition, Cornell University	2021
• NASA Outer Heliosphere Guest Investigator	2020–2023
• Cranson & Edna Shelley Outstanding Teaching Assistant Award, Cornell University	2020
• Honorable Mention, NSF Graduate Research Fellowship Competition	2020
• Cornell Graduate Student Fellowship	2018–2019
• Cornell Graduate Travel Grant	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	2017
• John Frederick Oberlin Merit Scholarship	2014–2018
• Valedictorian, Sir Francis Drake High School	2014
• Ellsworth Hagen Scholarship, Drake Scholarship Foundation	2014

RESEARCH EXPERIENCE

Cornell University Astronomy Graduate Research Assistant, Advisor: Prof. James Cordes	Ithaca, NY 2018–current
Oberlin College Physics & Astronomy Honors Program, Advisor: Prof. Dan Stinebring – Testing the Production of Scintillation Arcs with PSR B1133+16	Oberlin, OH 2017–2018

McGill Space Institute

Undergraduate Research Assistant, Advisor: Prof. Victoria Kaspi

- Modeling FRB 121102 as a Poisson Process
- Searching for Neutral Hydrogen Absorption in FRB 121102

Montreal, Canada
Summer 2016 & Summer 2017

San Francisco State University

Remote Research Assistant, Advisor: Prof. Stephen Kane

- Modeling the Retrieval of Lens Star Spectra During Microlensing Events

San Francisco, CA
2016–2017

Oberlin College

Undergraduate Research Assistant, Advisor: Prof. Dan Stinebring

- Testing Physical Models for Scintillation Arcs

Oberlin, OH
2015–2016

National Solar Observatory

REU Program, Advisor: Dr. Gordon Petrie

- Characterizing the Effects of Spatial Smoothing on Solar Magnetic Helicity Parameters and the Solar Hemispheric Helicity Sign Rule

Tucson, AZ
Summer 2015

PUBLICATIONS

1. **Ocker SK**, Gorsuch M, Cordes JM, Chatterjee S, et al. Radio scattering horizons for interstellar and extragalactic transients. In preparation. (2022)
2. **Ocker SK**, Cordes JM, Chatterjee S, et al. The large dispersion and scattering of FRB 20190520B are dominated by the host galaxy. Submitted to *ApJ*. (2022)
3. Niu CH, Li D, ..., **Ocker SK** et al. A repeating fast radio burst in a dense environment with a compact persistent radio source. arXiv:2110.07418 (2021)
4. Cordes JM, **Ocker SK**, Chatterjee S. Redshift estimation and constraints on intergalactic and interstellar media from dispersion and scattering of fast radio bursts. arXiv:2108.01172 (2021)
5. **Ocker SK**, Cordes JM, Chatterjee S, Dolch T. An in situ study of turbulence near stellar bow shocks. *ApJ* 922:233 <https://doi.org/10.3847/1538-4357/ac2b28> (2021)
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*. doi:10.1038/s41550-021-01363-7 (2021)
7. **Ocker SK**, Cordes JM, Chatterjee S. Constraining galaxy haloes from the dispersion and scattering of fast radio bursts and pulsars. *ApJ* 911:2. doi:10.3847/1538-4357/abeb6e (2021)
8. **Ocker SK**, Cordes JM, Chatterjee S. Electron density structure of the local Galactic disk. *ApJ* 897:2. doi:10.3847/1538-4357/ab98f9 (2020)
9. Stinebring DR, Rickett BJ, **Ocker SK**. The frequency dependence of scintillation arc thickness in pulsar B1133+16. *ApJ*. 870:2. <https://doi.org/10.3847/1538-4357/aaef80> (2019)
10. **Ocker SK**. Testing the production of scintillation arcs with the pulsar B1133+16. Electronic Thesis. Oberlin College, 2018. *OhioLINK Electronic Theses and Dissertations Center*. http://rave.ohiolink.edu/etdc/view?acc_num=oberlin1526565414057674
11. **Ocker SK**, Petrie G. The effects of spatial smoothing on solar magnetic helicity parameters and the hemispheric helicity sign rule. *ApJ*. 832:162. doi:10.3847/0004-637X/832/2/162 (2016)

INVITED TALKS

1. Exploring the Interstellar Medium from Voyager to Pulsars. Green Bank Observatory Colloquium (2021)
2. Voyager 1 Detects Persistent Plasma Waves in Interstellar Space. Interstellar Probe Workshop, Applied Physics Laboratory (2021)
3. Probing the Local ISM on Sub-AU Scales with Voyager. ASTRON/JIVE (2021)
4. Constraining Galaxy Haloes from the Dispersion and Scattering of Fast Radio Bursts. CHIME/FRB Collaboration Journal Club (2021)

CONTRIBUTED TALKS AND POSTERS

1. An In Situ Study of Turbulence Near Stellar Bow Shocks. Talk. NANOGrav Fall Meeting (2021)
2. Turbulence Near Stellar Bow Shocks. Talk. Voyager Interstellar Mission Science Steering Group (2021)
3. Interstellar Propagation Effects Near and Far. Talk. NANOGrav Spring Meeting (2021)
4. Voyager 1 Is Now an Interstellar Probe. Poster. KK Wang Cornell Space Tech Industry Day (2021)
5. Voyager 1 Detects Persistent Plasma Waves in Interstellar Space. Talk. Voyager Interstellar Mission Science Steering Group (2021)
6. Interstellar Turbulence Near the Heliospheric Boundary. Talk. Voyager Interstellar Mission Science Steering Group (2020)
7. Assessing Chromatic Arrival Time Perturbations for NANOGrav's Error Budget. Poster. 235th AAS Meeting (2020)
8. Multi-Frequency Scintillation Arc Study of Pulsar B1133+16. Poster. 233rd AAS Meeting (2019)
9. Multiple scintillation arcs in a nearby pulsar, B1133+16: crucial clues? Talk. University of Toronto Scintillometry with Pulsar VLBI Workshop (2017)
10. 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–
- NASA Outer Heliosphere Guest Investigator, Voyager Interstellar Mission 2020–2023
- Associate Member, North American Nanohertz Observatory for Gravitational Waves (NANOGrav) 2019–2021
- Carl Sagan Institute, Cornell University 2020–
- Cornell Center for Astrophysics and Planetary Science 2018 –
- Graduate Student Member, American Astronomical Society (AAS) 2018–

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

- **Tutor** at Oberlin College
Quantitative Skills Center

2015–2016

MENTORING

Research Experiences for Undergraduates, Cornell University

Mentee: Miranda Gorsuch, University of Wisconsin Stevens Point

Mentee: Samantha Rosenfeld, Union College

2021

2020

SKILLS

- **Programming languages:** Python, Mathematica, LaTeX, IDL, Fortran
- **Code:** NE2001, YMW16

LANGUAGES

- **French:** Intermediate
- **Hebrew:** Beginner
- **German:** Beginner

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

- Programming Workshop Leader, Research Experiences for Undergraduates, Cornell University June 2021
- Workshop Leader, Expanding Your Horizons, Cornell University April 2021, 2022
- 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

- Vice News/Motherboard Space Show: “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](#)
- Ask an Astronomer: “Earth’s Bow Shock” [curious.astro.cornell.edu](#)
- WKMG News 6 Space Curious Podcast: “How Big is the Solar System?” [clickorlando.com](#)
- NBC: “NASA spacecraft detects a constant ‘hum’ deep in the cosmos” [nbcnews.com](#)
- Gizmodo: “NASA’s Voyager 1 Probe Detects the Steady ‘Hum’ of Plasma in Interstellar Space” [gizmodo.com](#)
- NASA: “Voyager 1’s Density Measurements are Making Waves” [nasa.gov](#)
- Cornell Chronicle: “In the emptiness of space, Voyager 1 detects plasma ‘hum’” [news.cornell.edu](#)
- AASNova: “What Fast Radio Bursts Tell Us About Galaxy Halos” [aasnova.org](#)