

Sarah Betti

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Appointments

- 2023–present **STScI Prize Postdoctoral Fellow**, *Space Telescope Science Institute*, Baltimore, MD.
(50% independent science + 50% work for the Nancy Grace Roman Space Telescope)
- 2022–2023 **NASA Earth and Space Science and Technology (FINESST) Fellow**, *University of Massachusetts, Amherst*, Amherst, MA.
- 2020–2022 **Graduate Research Assistant**, *University of Massachusetts, Amherst*, Amherst, MA.
- 2018–2020 **FCAD Graduate Observational Teaching Fellow**, *Five College Astronomy Consortium*, Amherst, MA.
- 2017–2018 **Graduate Teaching Assistant**, *University of Massachusetts, Amherst*, Amherst, MA.
- 2015–2017 **Undergraduate Research Assistant**, *Haverford College*, Haverford, PA.
- 2015–2017 **Research Experience for Undergraduates Intern**, *National Radio Astronomy Observatory*, Green Bank, WV.

Education

- 2023 **Ph.D. in Astronomy**, *University of Massachusetts, Amherst*, Amherst, MA.
Advisor: Dr. Kate Follette
Dissertation: “Probing the Physical Mechanisms Responsible for Brown Dwarf and Giant Planet Formation”
- 2021 **M.S. in Astronomy**, *University of Massachusetts, Amherst*, Amherst MA.
- 2017 **B.S. cum laude Astrophysics**, *Haverford College*, Haverford PA, GPA: 3.763/4.0.
High Honors in Astrophysics
Thesis: “VLA Observations of the Magnetic Field of the Smith High Velocity Cloud”

Research Experience

- Current research experience on near infrared high contrast imaging and modeling of protoplanetary and debris disks, and near infrared spectroscopic observations of accretion onto brown dwarfs and protoplanets.
- Past research experience building an analysis pipeline for molecular cloud core surveys, synthetic observations of molecular cloud cores, sub-mm observations of dusty high redshift galaxies, and millimeter observations of high velocity clouds.
- Advising experience teaching optical data reduction and star cluster research for high school and undergraduate students. Running, teaching, and developing high school curriculum on observational astronomy and Python programming.

Professional Experience

- Technical experience working for the Roman Space Telescope at STScI on the Improved Roman Reference Calibration algorithm

Fellowships and Grants

- 2022–2023 **NASA FINESST, \$50,000.**
Title: “Probing the Physical Mechanisms Responsible for Brown Dwarf and Giant Planet Formation”
- 2022 **UMass Amherst Department of Astronomy Research Grant, \$500.**
- 2021 **UMass Amherst Department of Astronomy Research Grant, \$110.**
- 2020 **UMass Graduate School Dissertation Research Grant, \$750.**
University grant for research travel during the 2020-2021 semester; postponed due to COVID-19
- 2019 **Massachusetts Space Grant Consortium Fellowship, \$5500.**
- 2018–2022 **Mary Dailey Irvine Graduate Travel Award.**
2022-Spirit of Lyot Conference in Leiden, Netherlands June 2022, \$900
2019-AAS Meeting 235, \$1192
2018-16th Synthesis Imaging Workshop, \$400
2018-AAS Meeting 231, \$400
- 2018 **Massachusetts Space Grant Consortium Fellowship, \$5500.**
- 2016 **Frances Velay Womens’ Science Research Fellowship.**
Frances Velay Womens’ Science Research Fellowship Program grant for research

Refereed Publications: First Author

- 2023 **Betti, S. K.**, et al., “The Comprehensive Archive of Substellar and Planetary Accretion Rates”, *AJ*, 166, 262B.
- 2022 **Betti, S. K.**, et al., “Erratum: Near-infrared Accretion Signatures from the Circumbinary Planetary Mass Companion Delorme 1 (AB)b”, *ApJL*, 941, L20.
- 2022 **Betti, S. K.**, et al., “Near-infrared Accretion Signatures from the Circumbinary Planetary Mass Companion Delorme 1 (AB)b”, *ApJL*, 935, L18.
- 2022 **Betti, S. K.**, et al., “Detection of Near-Infrared Water Ice at the Surface of the (pre)Transitional Disk of AB Aur: Informing Icy Grain Abundance, Composition, and Size”, *AJ*, 163, 145.
- 2021 **Betti, S. K.**, et al., “The Robustness of Synthetic Observations in Producing Observed Core Properties: Predictions for the TolTEC Clouds to Cores Legacy Survey”, *ApJ*, 923, 25.
- 2019 **Betti, S. K.**, et al., “Environmental Effect on the Interstellar Medium in Galaxies across the Cosmic Web at $z = 0.73$ ”, *ApJ*, 874, 53.
- 2019 **Betti, S. K.**, et al., “Constraining the Magnetic Field of the Smith High-velocity Cloud Using Faraday Rotation”, *ApJ*, 871, 215.

Refereed Publications: Co-Author

- 2024 Rebolledo, I., et al., incl. **Betti, S. K.**, “JWST-TST High Contrast: Asymmetries, dust populations and hints of a collision in the β Pictoris disk with NIRCcam and MIRI”, *AJ*, 167, 69.

- 2023 Sallum, S., et al., incl. **Betti, S. K.**, “The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems IV: NIRISS Aperture Masking Interferometry Performance and Lessons Learned”, arXiv:2310.11499.
- 2023 Ray, S., et al., incl. **Betti, S. K.**, “The JWST Early Release Science Program for Direct Observations of Exoplanetary Systems III: Aperture Masking Interferometric Observations of the star HIP 65426 at $3.8\mu\text{m}$ ”, arXiv:2310.11508.
- 2022 Jorquera, S., Bonnefoy, M., **Betti, S. K.**, et al., “LBTI search for companions and sub-structures in the (pre)transitional disk of AB Aurigae”, *ApJ*, 926, 71.
- 2022 Hutschenreuter, S., Anderson, C. S., **Betti, S. K.**, et al., “The Galactic Faraday rotation sky 2020”, *A&A*, 657, A43.
- 2020 Pokhrel R., Gutermuth R. A., **Betti S. K.**, et al., “Star-Gas Surface Density Correlations in Twelve Nearby Molecular Clouds I: Data Collection and Star-Sampled Analysis”, *ApJ*, 896, 1.
- 2019 Ma Y. K., Mao S. A., Stil J., Basu A., West J., Heiles C., Hill A. S., **Betti, S. K.**, “A broad-band spectro-polarimetric view of the NVSS rotation measure catalogue - II. Effects of off-axis instrumental polarization”, *MNRAS*, 487, 3.
- 2019 Ma Y. K., Mao S. A., Stil J., Basu A., West J., Heiles C., Hill A. S., **Betti, S. K.**, “A broad-band spectro-polarimetric view of the NVSS rotation measure catalogue - I. Breaking the $n\pi$ -ambiguity”, *MNRAS*, 487, 3.

Non-Refereed Publications: Co-Author

- 2021 Dacus, B., Plunkett, C., Wang, H., Follette, K., **Betti, S. K.**, et al., “Toward Assembling a Comprehensive Database of Substellar Accretion Rates”, *RNAAS*, 5, 174.
- 2019 Lockman F., **Betti S. K.**, Hill A. S., Lehner N., Shelton R. L., Wakker B. P. (names listed in alphabetical order after first author): “High velocity Clouds: Building Blocks of the Local Group?” *Astro2020: Decadal Survey on Astronomy and Astrophysics, science white papers, no. 255; Bulletin of the American Astronomical Society*, Vol. 51, Issue 3, id. 255.

Conference Proceedings

- 2018 Ma Y. K., Mao S. A., Stil J., Basu A., West J., Heiles C., Hill A. S., **Betti, S. K.**, “From the NVSS RM Catalogue to Future Polarisation Surveys”, *Proceedings to IAU Focus Meeting: New Insights in Extragalactic Magnetic Fields*, XXXth IAU General Assembly.
- 2015 Kobelski A., Bastian T. S., **Betti, S. K.**, “Probing Solar Wind Turbulence with the Jansky Very Large Array”, *Coimbra Solar Physics Meeting: Ground-based Solar Observations in the Space Instrumentation Era Proceedings of a Meeting* (eds.) Ivan Dorotovic, Catherine E. Fischer, and Manuela Temmer, (San Francisco: ASP), 504.

Presentations & Workshops

Talks

- 2/2024 **Star and Planet Formation Seminar**, ESO Headquarters, Garching, Germany.
“CASPAR: Characterizing Accretion across the Brown Dwarf Regime”
- 12/2023 **Planet and Star Formation Tea**, MPIA, Heidelberg, DE.
“CASPAR: Characterizing Accretion across the Brown Dwarf Regime”

- 1/2023 **American Astronomical Society Winter Meeting**, Seattle, WA.
 “Characterizing Accretion and Formation Mechanisms across the Brown Dwarf and Planetary Mass Regimes”
- 11/2022 **Planet and Star Formation Tea**, MPIA, Heidelberg, DE.
 “NIR Accretion Signatures in the Circumbinary Planetary Mass Companion Delorme 1 (AB)b”
- 10/2022 **Planetary Lunch Series**, Massachusetts Institute of Technology, MA.
 “Observing Water Ice in the AB Aurigae Transitional Disk”
- 07/2022 **Northeast Star and Planet Formation 2022**, Wesleyan University, CT.
 “The Role of Environment in Core Evolution”
- 07/2022 **Cool Stars 21: Gaia and Spitzer’s Neighbourhood Watch Program: From Stars to Brown Dwarfs to Planets Splinter Session**, Toulouse, France.
 “NIR Accretion Signatures in the Circumbinary Planetary Mass Companion Delorme 1 (AB)b”
- 06/2022 **In the Spirit of Lyot 2022**, Leiden, Netherlands.
 “Mapping Icy Grains in the Circumstellar Disk around AB Aurigae”
- 12/2020 **Five Years after HL Tau: A New Era in Planet Formation Conference**, Virtual.
 “Mapping Icy Grains in the Circumstellar Disk around AB Aurigae”
- 10/2018 **Past, Current and Future Galaxy Surveys. CANDELS Meeting and TolTEC Workshop**, University of Massachusetts, Amherst, MA.
 “Environmental Effect on Interstellar Medium in Galaxies across the Cosmic Web at $z=0.73$ ”
- 07/2015 **National Radio Astronomy Observatory Lunch Talk**, Jansky Lab, Green Bank, WV.
 “Type III Bursts and the Solar Wind”
 ◦ Final REU summer presentation
- [Posters](#)
- 03/2024 **Extreme Solar Systems V**, Christchurch, NZ.
 “Coronagraphic JWST/NIRCam Images of the 49 Ceti Debris Disk”
- 06/2023 **Origins of Solar Systems Gordon Research Seminar**, Holyoke, MA.
 “Detection of Near-infrared Water Ice at the Surface of the (Pre)Transitional Disk of AB Aur”
- 05/2023 **Planetary Systems and the Origins of Life in the Era of JWST**, Baltimore, MD.
 “Characterizing Accretion and Formation Mechanisms across the Brown Dwarf and Planetary Mass Regimes”
- 04/2023 **Protostars and Planets VII**, Kyoto, Japan.
 “Characterising Accretion and Formation Mechanisms across the Brown Dwarf and Planetary Mass Regimes”
- 07/2022 **Cool Stars 21**, Toulouse, France.
 “NIR Accretion Signatures in the Circumbinary Planetary Mass Companion Delorme 1 (AB)b”
- 07/2021 **2021 Sagan Exoplanet Summer Virtual Workshop: Circumstellar Disks and Young Planets**, Virtual.
 “Mapping Icy Grains in the Transitional Disk AB Aur”
- 04/2021 **2021 Virtual STScI Spring Symposium: Towards the Comprehensive Characterization of Exoplanets**, *Science at the Interface of Multiple Measurement Techniques*, Virtual.
 “Mapping Icy Grains in the Transitional Disk AB Aur”

- 01/2021 **American Astronomical Society Winter Meeting**, Virtual.
 “Mapping Icy Grains in AB Aur: Constraining Composition, Growth, and Filtration”
 ○ iPoster Plus: gave a 5 min talk discussing poster
- 01/2020 **American Astronomical Society Winter Meeting**, Honolulu, HI.
 “The Role of Environment in Core Formation: Predictions for the TolTEC Clouds to Cores Legacy Survey”
 ○ iPoster Plus: gave a 5 min talk discussing poster
- 01/2018 **American Astronomical Society Winter Meeting**, National Harbor, Oxon Hill MD.
 “Quantifying the Role of Environment in Star Formation: ISM masses along the Cosmic Web with ALMA”
- 01/2017 **American Astronomical Society Winter Meeting**, Grapevine, TX.
 “VLA Observations of the Magnetic Field of the Smith High Velocity Cloud”
- 09/2016 **Start Talking Science**, *Chemical Heritage Foundation*, Philadelphia, PA.
 “Gas Clouds in Space: How the Smith Gas Cloud survived passing through the Milky Way.”
 ○ Only undergraduate presenter
- 09/2016 **Koshland Natural Integrated Science Center Research Symposium**, Haverford College, Haverford PA.
 “Gas Clouds in Space: How the Smith Gas Cloud survived passing through the Milky Way”
- 01/2016 **American Astronomical Society Winter Meeting**, Kissimmee, FL.
 “Probing Solar Wind Turbulence Using JVAS and VLA Calibrator Sources”

Panels

- 04/2016 **Young Women in Physics Conference**, Bucknell University, Lewisburg, PA.
 ○ Spoke about experiences as a woman in STEM as one of two undergraduates

Workshops

- 07/2021 **Circumstellar Disks and Young Planets**, *2021 Sagan Exoplanet Summer Virtual Workshop*, Virtual.
- 03/2020 **ALMA Proposal Workshop**, Amherst, MA.
- 01/2020 **JWST Proposal Planning Workshop**, Amherst, MA.
- 05/2018 **16th NRAO Synthesis Imaging Worksho**, Socorro, NM.

Observational Programs (*PI)

- 2024 ***Apache Point Observatory ARC 3.5m/TripleSpec, JH03.**
Probing the Accretion Paradigm for Substellar Objects
 Time awarded: 2 nights (1/2 each)
- 2024 **Very Large Telescope/CRIFES, 113.26AR**, PI: S. Ringqvist.
Are there accretion driven winds in circum-planetary disks? Probing the inner-disk of super-Jovian Delorme 1 (AB)b
 Time awarded: 6 hours
- 2024 **Very Large Telescope/CRIFES, 113.26J1**, PI: D. Demars.
Disentangling accretion flow geometry on a planetary-mass companion
 Time awarded: 7.5 hours
- 2023 ***Southern Astrophysical Research Telescope/TripleSpec 4.1, 2023A-267101.**
Probing Planetary Mass Companion Formation Paradigms with NIR Line Ratios
 Time awarded: 2 nights

- 2022 ***Southern Astrophysical Research Telescope/TripleSpec 4.1, 2022B-171130.**
Probing Substellar Formation Paradigms with NIR Accretion Diagnostics
 Time awarded: 3 nights
- 2022 **Keck I/LRIS, 2022B, PI: K. Follette.**
Establishing Accretion Relations for the Substellar Mass Regime
 Time awarded: 2 nights (1/2 each)
- 2022 **Hubble Space Telescope, Cycle 30, PI: C. Robinson.**
Testing Planetary Formation Mechanisms through the First FUV - Optical Spectrum of a Young, Accreting Planet
 Time awarded: 9 orbits
- 2022 ***Southern Astrophysical Research Telescope/TripleSpec 4.1, 2022A-336353.**
Probing the Accretion Paradigm for Substellar Objects
 Time awarded: 2 nights
- 2021 ***Southern Astrophysical Research Telescope/TripleSpec 4.1, 2021B-0311.**
Probing the Accretion Paradigm for Substellar Objects at 30 M_J
 Time awarded: 4.5 nights
- 2021 **Keck I/LRIS, 2021B, PI: K. Follette.**
Establishing Accretion Relations for the Substellar Mass Regime
 Time awarded: 3 nights (1/2 each)
- 2021 ***Southern Astrophysical Research Telescope/TripleSpec 4.1, 2021A-0261.**
Probing the Accretion Paradigm for Substellar Objects
 Time awarded: 1 night
- 2021 **Keck I/LRIS, 2021A, PI: K. Follette.**
Establishing Accretion Relations for the Substellar Mass Regime
 Time awarded: 2 nights (1/2 each)

Teaching Experience

- 2020–2021 **Course Head and Coordinator, UMASS Precollege Summer Astronomy Program, Amherst, MA.**
Developed, organized, and taught a 3 week pre-college astronomy course centered around students learning fundamentals of astronomy through lectures, and optical data reduction techniques; supervised traditional labs, virtual Jupyter notebook optical data reduction and analysis lab activities, ran observing nights, and organized final student presentations.
- 2019, 2022 **Lab Coordinator, UMASS Precollege Summer Astronomy Program, Amherst, MA.**
Developed and taught a 2 to 3-week python based optical data reduction and analysis lab course. Organized and managed an observing night at the Amherst College Observatory using 11" Schmidt-Cassegrain telescopes with eyepieces and CCDs.
- 2018–2021 **Teaching Assistant, University of Massachusetts, Amherst, MA.**
 Astronomy 337 & 341 Observational Astronomy courses: *Research based courses using the Smith College 12" and 16" Schmidt-Cassegrain telescope and the 0.9 m telescope at Kitt Peak Observatory. Assisted in teaching & mentoring students in conducting research projects.*
- 2018 **Lab Teaching Assistant, University of Massachusetts, Amherst, MA.**
Ran and taught Astronomy 100 Laboratory and Discussion sections. Introduced students to basic astronomy concepts using Stellarium
- 2015–2017 **Telescope/Lecture Teaching Assistant, Haverford College, Haverford, PA.**
Trained Astronomy 205: Intro to Astrophysics students on 12" Schmidt-Cassegrain telescope. Assisted Astronomy 206: Intro to Astrophysics students on problem sets and coding in python.

- 2015–2016 **Grader**, *Haverford College*, Haverford, PA.
Graded Fundamental Physics student problem sets (Fall 2015), *Introduction to Electrodynamics student problem sets (Spring 2016)*, and *Waves and Optics student problem sets (Fall 2016)*, *Introduction to Astrophysics student problem sets (Spring 2017)*

Outreach, Service & Activities

- 2024-present **Diversity, Culture, Respect Working Group**, *Space Telescope Science Institute*, Baltimore, MD.
- 02/2024 **JWST Cycle 3 Panel Support Scientist**, *Space Telescope Science Institute*, Baltimore, MD.
- 2019–2023 **UMass Amherst Graduate Student Senate Senator**, *University of Massachusetts, Amherst*, Amherst, MA.
- 2020–2023 **Member of Diversity, Equity, and Inclusion in Departmental Statics Committee**, *Department of Astronomy, University of Massachusetts, Amherst*, Amherst, MA.
Grad student-led committee formed to gather statistics about retention, diversity, and inclusion within all levels of the department in order to promote DEI within the astronomy department.
- 2020–2021 **Sound Bites Cafe Volunteer**, *Graduate Women in Stem, University of Massachusetts, Amherst*, Amherst, MA.
Talk: “Exoplanets! Search for Planets around Other Stars”
Lead discussion and gave presentation about exoplanets and their formation to middle and high school science classes
- 11/2020 **Guest Speaker**, *Southern Maine Astronomy Club Public Lecture*, Virtual.
Talk: “Formation of Exoplanets in Circumstellar Disks”
- 2020 **Interview with an Astronomer**, *Astronomy in the Community, University of Massachusetts, Amherst*, Amherst, MA.
Lead discussions about social issues in space science and was interviewed for a sixth grade project
- Fall 2019, Fall 2020 **Faculty Meeting Graduate Student Representative**, *University of Massachusetts, Amherst*, Amherst, MA.
Attended departmental faculty meetings as a representative of the graduate student body
- 2018–2022 **Graduate Student Recruitment Committee**, *University of Massachusetts, Amherst*, Amherst, MA.
- 2018 **Astronomy Day Girl Scout Camp Volunteer**, *Astronomy in the Community, University of Massachusetts, Amherst*, Amherst, MA.
Run day long event teaching and leading astronomy activities to kindergarten to middle school girl scouts
- 2018 **Local High School Astronomy Club**, *Astronomy in the Community, University of Massachusetts, Amherst*, Amherst, MA.
Lead discussions and presentations about hot astronomy topics including gravitational waves and black holes for students in high school astronomy
- 11/2016 **Guest Speaker**, *Physics with Friends, Haverford College*, Haverford, PA.
Talk: “Gas Clouds in Space”

2015–2017 **Astronomy Public Outreach Head**, *Astronomy Public Observing Program, Haverford College*, Haverford, PA.

Manage and organize the public observing program. Interact with professional astronomers and astronomy. Delegate jobs and oversee volunteers at events. Host private groups for personal observing by giving talks, leading discussions, and running telescopes.

Public talk: “The Sun: From Birth to Death”, March 18, 2016

2014–2017 **Koshland Integrated Natural Science Center Student Advisory Committee**, *Haverford College*, Haverford, PA.

Meet with the KINSC program coordinator and the faculty to ensure student funding and programs are available for all Haverford students

2014–2015 **Astronomy Public Outreach Volunteer**, *Astronomy Public Observing Program, Haverford College*, Haverford, PA.

Run telescopes and help with crafts at public observing program

Public talk: “Constellations: What are they and Their Place in Modern Astronomy”, March 21, 2015

Organization Membership

2016-present American Astronomical Society

2011-2019 International Dark Sky Association

2016-2017 Society of Physics Students

Technical Experience

Multiwavelength **Optical Imaging**: WIYN 0.9 m telescope

Data

- IR Imaging: LBT, APO, IRTF, JWST

Reduction

- IR Spectroscopy: SOAR

Experience

- Sub-mm Interferometry imaging: Atacama Large Millimeter Array

- Sub-mm imaging: Large Millimeter Telescope Alfonso Serrano

- Radio Interferometry imaging : Very Large Array

Observing

- Keck I/LRIS

Experience

- Southern Astrophysical Research Telescope/TripleSpec 4.1

- Apache Point Observatory/TripleSpec

- IRTF/iSHELL

- Kitt Peak Observatory 0.9 m WIYN telescope/HDI

- 11” alt-az and equatorial Schmidt-Cassegrain Amherst College telescopes including the SBIG CCD

Software

- Python, IDL, Common Astronomy Software Applications (CASA), Mathematica, yt, MCFOST, pyKLIP, SAOImage ds9

References

Dr. Christine Chen, *Associate Astronomer, Space Telescope Science Institute, Baltimore MD*, email: cchen@stsci.edu, 410-338-5087.

Dr. Kate Follette, *Assistant Professor of Astronomy, Amherst College, Amherst MA*, email: kfollette@amherst.edu, 413-542-593.

Dr. Robert Gutermuth, *Associate Research Professor of Astronomy, University of Massachusetts, Amherst, Amherst MA*, email: rgutermu@astro.umass.edu, 413-545-1253.