
Sarah Betti

CONTACT INFORMATION

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EDUCATION

University of Massachusetts, Amherst, Amherst MA 01003

Ph.D candidate in Astronomy, expected 2024

2nd year research project: The Role of Environment in Core Evolution: Predictions for the TolTEC Clouds to Cores Legacy Survey (Advisor: Dr. Robert Gutermuth)

1st year research project: Environmental Effect on ISM Mass in Galaxies along the Cosmic Web at $z \sim 0.7$ (Advisor: Dr. Alexandra Pope)

Haverford College, Haverford PA 19041

B. S. *cum laude* Astrophysics, May 2017

GPA: 3.763/4.0

High Honors in Astrophysics

Thesis: VLA Observations of the Magnetic Field of the Smith High Velocity Cloud (Advisor: Dr. Alex S. Hill)

RESEARCH

Graduate Research Assistant

2020-present

University of Massachusetts, Amherst, Department of Astronomy

Advisor: Dr. Kate Follette

- Investigating icy giant planet formation through reducing and analyzing icy dust grains in the circumstellar disk of AB Aurigae from the LBT.
- Investigating accretion onto brown dwarfs in order to determine formation mechanism compared to planetary mass companions and stars.

Graduate Research Assistant

2019-present

University of Massachusetts, Amherst, Department of Astronomy

Advisor: Dr. Robert Gutermuth

- Investigated how core formation is predicted to appear from simulations that emulate different environments when observed by the Large Millimeter Telescope in millimeter continuum in order to study how cores are affected by different environmental factors.
- Wrote and optimized data reduction pipeline for AzTEC/TolTEC LMT data of molecular cloud cores for Clouds to Cores Survey

Graduate Research Assistant

2018

University of Massachusetts, Amherst, Department of Astronomy

Advisor: Dr. Alexandra Pope

- Investigated the effect of local galaxy environment on star formation in high redshift galaxies by analyzing ALMA data

Undergraduate Research Assistant

2015 - 2017

Haverford College, Department of Physics and Astronomy

Advisor: Dr. Alex S. Hill

- Investigated the magnetic field of the Smith High Velocity Cloud by analyzing VLA and WHAM-NSS data, wrote and implemented complex scripts in python and IDL, analyzed large astronomical catalogues, and modeled magnetic field of the Smith Cloud
- Awarded fellowship from the Frances Velay Women's Science Research Fellowship for women in STEM fields for summer 2016 as one of ten recipients college wide

	National Radio Astronomy Observatory Summer Student Research Assistant (REU) National Radio Astronomy Observatory, Green Bank, WV Advisors: Dr. Tim Bastian and Dr. Adam Kobelski <ul style="list-style-type: none"> • Probed type III bursts in solar flares and scattering phenomena in the outer solar corona by reducing VLA data using CASA to create image • Gathered and reduced data from the Green Bank 40 foot radio telescope and presented analysis to NRAO astronomers. 	Summer 2015
EMPLOYMENT	Teaching Assistant University of Massachusetts, Amherst, Department of Astronomy <ul style="list-style-type: none"> • Assisted in Astronomy 337 and Astronomy 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 based on data they took from the above telescopes 	Fall 2018 - present
	Teaching Assistant University of Massachusetts, Amherst, Department of Astronomy <ul style="list-style-type: none"> • Ran and taught Astronomy 100 Laboratory and Discussion sections • Introduced students to basic astronomy concepts using Stellarium 	Spring 2018
	Researcher Haverford College, Department of Physics and Astronomy <ul style="list-style-type: none"> • Wrote and implemented 3D model of a magnetic field for the Smith Cloud by modeling the cloud as an ellipse using python • Wrote research paper of undergraduate thesis for publication in an astrophysical journal 	Summer 2017
	Teaching Assistant Haverford College, Department of Physics and Astronomy <ul style="list-style-type: none"> • Assisted <i>Astronomy 206: Intro to Astrophysics</i> students on problem sets and coding in python 	Spring 2017
	Telescope Teaching Assistant Haverford College, Department of Physics and Astronomy <ul style="list-style-type: none"> • Trained <i>Astronomy 205: Intro to Astrophysics</i> students on 12" Schmidt-Cassegrain telescope 	2015 - 2016
	Grader Haverford College, Department of Physics and Astronomy <ul style="list-style-type: none"> • Graded <i>Fundamental Physics</i> student problem sets (Fall 2015), <i>Introduction to Electrodynamics</i> student problem sets (Spring 2016), and <i>Waves and Optics</i> student problem sets (Fall 2016), <i>Introduction to Astrophysics</i> student problem sets (Spring 2017) 	2015 - 2016
FELLOWSHIPS AND GRANTS	Graduate School Dissertation Research Grant - \$750 University of Massachusetts, Amherst <ul style="list-style-type: none"> • University grant for research travel during the 2020-2021 semester 	2020
	Mary Dailey Irvine Graduate Travel Award - \$1192 University of Massachusetts, Amherst <ul style="list-style-type: none"> • Department grant for travel to AAS in Honolulu, HI January 2020 	2019

	Massachusetts Space Grant Consortium Summer Research Fellow - \$5500 University of Massachusetts, Amherst <ul style="list-style-type: none"> Fellowship awarded for research at the University of Massachusetts during Summer 2019 under Dr. Rob Gutermuth, as part of NASA's National Space Grant College and Fellowship Program 	2019
	Massachusetts Space Grant Consortium Summer Research Fellow - \$5500 University of Massachusetts, Amherst <ul style="list-style-type: none"> Fellowship awarded for research at the University of Massachusetts during Summer 2019 under Dr. Alexandra Pope, as part of NASA's National Space Grant College and Fellowship Program 	2018
	Mary Dailey Irvine Graduate Travel Award Spring - \$400 University of Massachusetts, Amherst <ul style="list-style-type: none"> Department grant for travel to 16th Synthesis Imaging Workshop 	2018
	Mary Dailey Irvine Graduate Travel Award Spring - \$400 University of Massachusetts, Amherst <ul style="list-style-type: none"> Department grant for travel to AAS at National Harbor January 2018 	2018
	Frances Velay Womens' Science Research Fellowship Haverford College <ul style="list-style-type: none"> Frances Velay Womens' Science Research Fellowship Program grant for research during Summer 2016 	2016
WORKSHOPS	ALMA proposal workshop Amherst MA	March 2020
	JWST Proposal Planning Workshop Amherst MA	January 2020
	16th NRAO Synthesis Imaging Workshop Socorro NM	May 2018
PROPOSALS	Southern Astrophysical Research Telescope - 2021A <ul style="list-style-type: none"> <i>Probing the Accretion Paradigm for Substellar Objects</i> 	May 2021
OUTREACH EXPERIENCE	Course Head and Coordinator UMASS Precollege Summer Astronomy Program, University of Massachusetts, Amherst <ul style="list-style-type: none"> Developed, organized, and taught a three week pre-college astronomy course centered around students learning fundamentals of astronomy through lectures, and optical data reduction techniques through python based labs with the goal of analyzing and presenting color magnitude diagrams of optical astronomy star cluster data 	Summer 2020 - present
	Volunteer Astronomy in the Community, University of Massachusetts, Amherst <ul style="list-style-type: none"> Interview with an Astronomer 	2020

- Lead discussions about social issues in space science and was interviewed for a sixth grade project

Lab Coordinator

Summer 2019

UMASS Precollege Summer Astronomy Program, University of Massachusetts, Amherst

- Developed, organized, and taught a two week python based lab course centered around students taking, reducing, analyzing, and presenting color magnitude diagrams of optical astronomy star cluster data
- Organized and managed an observing night at the Amherst College Observatory using 11" Schmidt-Cassegrain telescopes with eyepieces and CCDs

Teacher

Summer 2018

UMASS Precollege Summer Astronomy Program, University of Massachusetts, Amherst

- Teach astronomy labs using the astronomy software STELLARIUM to high school students to introduce them to concepts of Kepler's laws, astronomical distances and exoplanets
- Assist with observing at telescope and night time sky shows

Volunteer

2018

Astronomy in the Community, University of Massachusetts, Amherst

- Astronomy Day Girl Scout Camp
 - Run day long event teaching and leading astronomy activities to kindergarten to middle school girl scouts
- Local High School Astronomy Club
 - Lead discussions and presentations about hot astronomy topics including gravitational waves and black holes for students in high school astronomy

Astronomy Public Outreach Head

2015 - 2017

Astronomy Public Observing Program, Haverford College

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

Volunteer

2014 - 2015

Astronomy Public Observing Program, Haverford College

- Run telescopes and help with crafts at public observing program

REFEREED
PUBLICATIONS:
FIRST AUTHOR

Betti, S. K., Pope, A., Scoville, N., Yun M. S., Aussel H., Kartaltepe J., Sheth K. (2019): "Environmental Effect on the Interstellar Medium in Galaxies across the Cosmic Web at $z = 0.73$," *ApJ*, 874, 53.

Betti, S. K., Hill A. S., Mao S. A., Gaensler B. M., Lockman, F. J., McClure-Griffiths N. M., Benjamin R. A. (2019): "Constraining the Magnetic Field of the Smith High-velocity Cloud Using Faraday Rotation," *ApJ*, 871, 215.

REFEREED
PUBLICATIONS:
CO AUTHOR

Pokhrel R., Gutermuth R. A., **Betti S. K.**, Offner S. S. R., Myers P. C., Megeath S. T., Sokol A. D., Ali B., Allen L., Allen T. S., Dunham M M., Fischer W. J., Henning T., Heyer M., Hora J. L., Pipher J. L., Tobin J. J., Wolk S. J., (2020), “Star-Gas Surface Density Correlations in Twelve Nearby Molecular Clouds I: Data Collection and Star-Sampled Analysis,” *ApJ*.

Ma Y. K., Mao S. A., Stil J., Basu A., West J., Heiles C., Hill A. S., **Betti, S. K.**, (2019): “A broad-band spectro-polarimetric view of the NVSS rotation measure catalogue - II. Effects of off-axis instrumental polarization,” *MNRAS*, 487, 3.

Ma Y. K., Mao S. A., Stil J., Basu A., West J., Heiles C., Hill A. S., **Betti, S. K.**, (2019): “A broad-band spectro-polarimetric view of the NVSS rotation measure catalogue ? I. Breaking the n?-ambiguity,” *MNRAS*, 487, 3.

Lockman F., **Betti S. K.**, Hill A. S., Lehner N., Shelton R. L., Wakker B. P. (names listed in alphabetical order after first author) (2019): “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
PRECEEDINGS

Ma Y. K., Mao S. A., Stil J., Basu A., West J., Heiles C., Hill A. S., **Betti, S. K.**, (2018): “From the NVSS RM Catalogue to Future Polarisation Surveys,” *Proceedings to IAU Focus Meeting: New Insights in Extragalactic Magnetic Fields*, XXXth IAU General Assembly

Kobelski A., Bastian T. S., **Betti, S. K.** (2015): “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

Panels

Young Women in Physics Conference, Bucknell University, Lewisburg, PA, April 2, 2016.

- Spoke about experiences as a woman in STEM as one of two undergraduates

Posters

“Mapping Icy Grains in AB Aur: Constraining Composition, Growth, and Filtration” American Astronomical Society Winter Meeting, Virtual, January 10-15, 2021

- iPoster Plus: gave a 5 min talk discussing poster

“The Role of Environment in Core Formation: Predictions for the TolTEC Clouds to Cores Legacy Survey” American Astronomical Society Winter Meeting, Honolulu, HI, January 7, 2020

“Quantifying the Role of Environment in Star Formation: ISM masses along the Cosmic Web with ALMA” American Astronomical Society Winter Meeting, National Harbor, Oxon Hill MD, January 9, 2018

“VLA Observations of the Magnetic Field of the Smith High Velocity Cloud” American Astronomical Society Winter Meeting, Grapevine, TX, January 6, 2017

“Gas Clouds in Space: How the Smith Gas Cloud survived passing through the Milky Way.” Start Talking Science, Chemical Heritage Foundation, Philadelphia, PA, September 27, 2016.

- Only undergraduate presenter

“Gas Clouds in Space: How the Smith Gas Cloud survived passing through the Milky Way,” Koshland Natural Integrated Science Center Research Symposium, Haverford College, September 24, 2016

“Probing Solar Wind Turbulence Using JVAS and VLA Calibrator Sources” American Astronomical Society Winter Meeting, Kissimmee, FL, January 5, 2016

Talks

“Mapping Icy Grains in the Circumstellar Disk of AB Aurigae”, Five Years after HL Tau: A New Era in Planet Formation Conference, December 7-11, 2020.

“Exoplanets! Search for Planets around Other Stars”, Graduate Women in Stem Sound Bites Cafes, Amherst Middle School and West Springfield Middle School, Amherst MA, November 18, 2020.

- Presented to middle schoolers interested in STEM

“Formation of Exoplanets in Circumstellar Disks”, Southern Maine Astronomy Club Public Lecture, November 5, 2020.

“Environmental Effect on Interstellar Medium in Galaxies across the Cosmic Web at $z=0.73$ ”, Past, Current and Future Galaxy Surveys. CANDELS Meeting and TolTEC Workshop, University of Massachusetts, Amherst, MA, October 21-23, 2018.

“Gas Clouds in Space,” Physics with Friends, Haverford College, November 12, 2016.

- Presented to Haverford undergraduate, professors, and Society of Physics Students members

“The Sun: From Birth to Death,” Strawbridge Observatory Public Outreach Event, Haverford College, March 18, 2016.

- Presented to a general audience of children and adults

“Type III Bursts and the Solar Wind,” National Radio Astronomy Observatory Colloquium, Jansky Lab, Green Bank, WV, July 2015.

- Presented to astronomers and employees of the NRAO

“Constellations: What are they and Their Place in Modern Astronomy,” Strawbridge Observatory Public Outreach Event, Haverford College, March 21, 2015.

- Presented to a general audience of children and adults

ACTIVITIES

DEI Departmental Statistics subcommittee

2020-present

University of Massachusetts, Amherst

- Gathered statistical evidence of need for DEI improvements in the department.
- One of four graduate led DEI subcommittees aimed to address DEI in the department.

Faculty Meeting Graduate Student Representative

Fall 2019, Fall 2020

University of Massachusetts, Amherst

- Attended departmental faculty meetings as a representative of the graduate student body

Graduate Student Recruitment Committee

Spring 2018, Spring 2019, Spring 2020

University of Massachusetts, Amherst

- Answered questions from prospective graduate students
- Helped organize the visit(s) of potential students

Collegiate Varsity Field Hockey

2013 - 2016

Haverford College

- William W. Ambler Award honoree, Spring 2017
 - One of fifteen senior scholar-athletes with the highest GPAs in the varsity athletic program
- Academic Honor Roll, Fall 2015, Fall 2016
 - Highest academic honor given during athletic season through the Centennial Conference for GPA > 3.4
- National Field Hockey Coaches Association Academic Squad, Fall 2015, Fall 2016
 - Highest academic honor given during athletic season through the NFHCA for GPA > 3.3
- Most Improved, Fall 2014

Koshland Integrated Natural Science

2014 - 2017

Center Student Advisory Committee

Haverford College

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

ORGANIZATION MEMBERSHIP

American Astronomical Society, Junior Member (2016-present)
International Dark Sky Association, Member (2011-present)
Society of Physics Students (2016-2017)

TECHNICAL EXPERIENCE

Querying large datasets (SDSS, GAIA)

Computing: Python, IDL, CASA, Mathematica, yt, MCFOST, pyKLIP

Multiwavelength observations:

- Optical Imaging: WIYN 0.9 m telescope
- IR Imaging: LBT, APO, IRTF
- Sub-mm Interferometry imaging: Atacama Large Millimeter Array
- Sub-mm imaging: Large Millimeter Telescope Alfonso Serrano
- Radio Interferometry imaging : Very Large Array

Telescopes:

- operate the 11" alt-az and equatorial Schmidt-Cassegrain Amherst College telescopes including the SBIG CCD
- operate the 0.9 m WIYN telescope at Kitt Peak Observatory using the HDI CCD.
- operate the 12" and 16" Schmidt-Cassegrain Smith College telescopes and SBIG CCD
- operate the equatorial mounted manual University of Massachusetts, Amherst telescope
- operate the 12" and 16" Schmidt-Cassegrain Haverford College telescopes and photometer

REFERENCES

Dr. Kate Follette, Assistant Professor of Astronomy, Amherst College, Amherst MA
email: kfollette@amherst.edu, 413-542-5938

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

Dr. Alexandra Pope, Associate Professor of Astronomy, University of Massachusetts, Amherst, Amherst MA
email: pope@astro.umass.edu, 413-545-1769