

# Carolyn ‘Carrie’ Volpert

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## EDUCATION

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### University of Maryland

*Astronomy PhD Student*

College Park, MD

Aug. 2018 – Present

### University of Maryland

*Master of Science, Astronomy*

College Park, MD

Aug. 2018 – December 2020

### University of Chicago

*Bachelor’s Degree, Physics (Specialization in Astrophysics)*

Chicago, IL

Sept. 2013 – June 2017

## EXPERIENCE

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### Graduate Research Assistant

*NASA Goddard Spaceflight Center*

*Research contractor through the CRESST II Collaboration*

Feb. 2019 – Present

Greenbelt, MD

40 hrs/week

- A member of the EXCLAIM Collaboration – a far-infrared/sub-mm high-altitude ballooning mission, whose primary goals are to demonstrate the capabilities of a new infrared technology, use line intensity mapping to map star forming gas at intermediate redshifts, and investigate the properties of PDRs in the Milky Way
- Performs cryogenic testing and calibration measurements of novel prototype MKIDs (superconducting far-infrared detector devices) and micro-spectrometers (cutting edge reduced-size microwave spectrometers)
- Responsible for producing instrument calibration testing plans and creating, integrating, and testing the new cryogenic test-bed components required to carry out characterization
- Develops software for communicating with lab hardware, processing test data, analyzing aforementioned data, and modeling future performance and fundamental physical properties from test results
- Co-designed the in-flight and post-flight observation calibration strategy (astrometry, atmospheric loading, beam size and shape, mapping side lobes, etc.)
- Plans the project’s Milky-Way observations, with a focus on mapping [CI] near the galactic plane to draw conclusions about the carbon cycle in Galactic Photo-Dissociation Regions (PDRs). Will be responsible for analysing and publishing this data
- Currently hosts and runs the EXCLAIM group GitHub repository
- Presents talks about progress on EXCLAIM at conferences, and is preparing papers for publication on current results.

### Graduate Teaching Assistant

*University of Maryland*

- Instructed Astronomy 101 labs and discussion sections for a group of 40 undergraduates
- Received positive evaluations from students and instructor

Aug. 2018 – Jan. 2019

College Park, MD

20 hrs/week

### Post-graduate Research Assistant

*University of Chicago*

- Continued previous work on HAWC+ NASA SOFIA instrument
- Developed code for pointing and source identification and verification in post-flight data
- Developed code to perform real-time data quality analysis
- Participated in diagnosing instrument cryogen and optical alignment problems using ground test data
- Flew with the HAWC+ instrument on several SOFIA flights to test my real-time data quality analysis software

June 2017 – June 2018

Chicago, IL

35 hrs/week

### Undergraduate Research Assistant

*University of Chicago*

- Contributed to building and testing the data pipeline used to process data from the HAWC+ instrument on NASA’s SOFIA observatory
- Wrote code to perform phase calibration, noise elimination, and error analysis of HAWC+ initial data
- Was awarded a Metcalf Internship to continue scientific summer research

Jan. 2015 – June 2017

Chicago, IL

16 hrs/week (in-semester)  
34 hrs/week (summers/breaks)

## LEADERSHIP AND OUTREACH

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### Yerkes Workshops

Dec. 2014 – June 2017

- Founded a series of skill-based astronomy instrumentation workshops at the Yerkes Observatory for undergraduate students 4 hrs/week
- Organized logistics, wrote the curriculum, and lead workshop sessions
- Arranged guest speakers, travel to and from the observatory, and secured funding to ensure the opportunity was free for students
- Taught over 120 students over the course of 2.5 years

### Astronomy Major Committee

Sept. 2016 – June 2017

- Was invited to serve as the undergraduate representative on the University of Chicago dept. of Astronomy committee assembled to address the creation of a new astronomy major 1hr/week
- Advocated to the committee for the creation of an undergraduate major
- Participated in designing the curriculum and requirements for the new major
- Saw the first students graduate with the new astronomy major in 2019

## TECHNICAL SKILLS

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**Programming Languages:** Python proficient, some C/C++, some MATLAB, HTML/CSS

**Lab Skills:** operation of transition edge sensors, operation of kinetic inductance detectors, RF readout and wiring, handling sub-K cryogenic systems, lab electronics (soldering, cable making, circuits etc.), superconducting device testing and modelling, epoxy handling, managing vacuum systems, PID controls, VNAs, RF-SoC, building test-beds, optical alignment, other misc. lab task skills

**Data Analysis:** noise-equivalent-power and noise-equivalent-intensity modeling, image and spectral convolution, data fitting, two-level system noise modeling, observation field-of-view and scan strategy simulation, common PDR modelling tools, gas filament analysis tools, taking and analysing spectral data, building readout software (networking with hardware etc.)

**Developer Tools:** Git, Google Cloud Platform, PyCharm, Sublime, Spyder

**Libraries:** Numpy, Scipy, Matplotlib, Astropy, Healpy, Pandas, Pyfits, Statsmodels, Scraps

## TALKS

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- Volpert, C. G., "An Update on the Experiment for Cryogenic Large-Aperture Intensity Mapping (EXCLAIM): Using novel micro-spectrometers to unveil star formation history via intensity mapping", Line Intensity Mapping Conference, July 2022, Chicago, IL USA
- Volpert, C. G., "Low-Loss Thin-Film Al-on-Si Microwave Resonators for Astronomy Applications: Designing and characterizing the next generation of microwave detectors", Low Temperature Detector Conference (LTD19), July 2022, Boulder, CO USA

## PUBLICATIONS

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1. Essinger-Hileman, T; Oxholm, T; et al. (EXCLAIM collaboration team including Carolyn Volpert), International Society for Optics and Photonics, 11453, 12/2020

title: *The EXperiment for Large-Aperture Intensity Mapping*

2. Cataldo, G; Ade, PA; et al. (EXCLAIM collaboration team including Carolyn Volpert), International Society for Optics and Photonics, 11445, 12/2020

title: *The EXperiment for Large-Aperture Intensity Mapping*

3. Mirzaei, M; Barrentine, E; et al. (EXCLAIM collaboration team including Carolyn Volpert), International Society for Optics and Photonics, 11453, 12/2020

title: *The EXperiment for Large-Aperture Intensity Mapping*

4. Oxholm, T; Ade, PA et al. (EXCLAIM collaboration team including Carolyn Volpert), American Astronomical Society Meeting Abstracts 236, 02/2020

title: *The EXperiment for Large-Aperture Intensity Mapping*

5. Ade, PA; Anderson, CJ; Barrentine, EM; et al. (EXCLAIM collaboration team including Carolyn Volpert), Low Temperature Physics, 10/2019

title: *The EXperiment for Large-Aperture Intensity Mapping (EXCLAIM)*

6. Santos, FP; Chuss, DT; Dowell, CD, et al. (HAWC+ collaboration team including Carolyn Volpert), The Astrophysical Journal, 882, 09/2019

title: *The far-infrared polarization spectrum of Rho Ophiuchi A from HAWC+/SOFIA observations*

7. Chuss, DT; Andersson, BG; Bally, J; et al. (HAWC+ collaboration team including Carolyn Volpert), The Astrophysical Journal, 872, 2/2019

title: *HAWC+/SOFIA Multiwavelength Polarimetric Observations of OMC-1*

8. Jones, TJ; Dowell, CD; Rodriguez, ER, et al. (HAWC+ collaboration team including Carolyn Volpert), Astrophysical Journal Letters, 870, 01/2019

title: *SOFIA Far-infrared Imaging Polarimetry of M82 and NGC 253: Exploring the Supergalactic Wind*

9. Harper, DA; Runyan, MC; Dowell, CD, et al. (HAWC+ collaboration team including Carolyn Volpert), Journal of Astronomical Instrumentation, 7, 04, 12/2018

title: *HAWC+, The Far-infrared Camera and Polarimeter for SOFIA*

10. Bradstreet, David H; Sanders, SJ; Volpert, CG;; American Astronomical Society Meeting Abstracts, 221 01/2013

title: *Light Curves and Analyses of the Eclipsing Overcontact Binaries V546 And V566 And the Discovery of a New Variable Star*