

Katherine Melbourne

Systems Engineer and Graduate Student interested in Space Sustainability Research

✉ melbournekatherine@gmail.com
📄 katiemelbourne.me

Education

2021–Present **Aerospace Engineering Ph.D. Student**, *University of Colorado*, Boulder, CO.
2015–2019 **B.S. Astrophysics**, *Yale University*, New Haven, CT.

Professional Experience

Present **Ball Aerospace**, Boulder, CO

Systems Engineer I

- Coordinate updates to James Webb Space Telescope commissioning procedure documentation
- Perform data analysis in Python as needed to support JWST commissioning preparation efforts
- Adapt to anomalies in JWST mirror alignment processes while on console in front of customer
- Review documentation and provide constructive edits before delivery to customer or archival
- Perform trade study on quantum-assisted super resolution and applications with research team
- Collaborate on effort to build optical bench to test quantum super-resolution capabilities
- Managed requirements for Roman Space Telescope contract between Ball and NASA GSFC
- Presented science applications of Roman and JWST in full-team meetings
- Serve as company Diversity and Inclusion Ally

Summer 2019 **Ball Aerospace**, Arlington, VA

Brooke Owens Fellow – Strategic Operations

- Synthesized business strategy across company competencies to expedite future procurement campaigns
- Strategized company's role in new space industry initiatives and opportunities
- Created engaging platforms of communication about Ball's heritage and work in science and engineering
- Leveraged professional network to discuss importance of gender-representation in space industry

2017 – 2018 **Yale Center for Teaching and Learning**, New Haven, CT

STEM Education Undergraduate Fellow

- Operated communications for Helmsley STEM Education Program at Yale
- Coordinated professional events with leaders in STEM education research from universities nationwide

Spring 2017 **National Aeronautics and Space Administration**, Washington, D.C.

Office of International and Interagency Relations Intern

- Drafted and negotiated 15 agreements that align with the missions of NASA nationally and globally
- Finalized 3 agreements with foreign partners by communicating diplomatically with their legal teams
- Briefed senior officials about upcoming meetings with foreign administrators and international trips
- Spearheaded and ensured success of Aeronautics Research Associate Administrator's visit to Russia

Research Experience

Summer 2018 **National Aeronautics and Space Administration**, Greenbelt, MD

Astrophysics Research Intern

- Characterized spectra of M dwarf stars to support photochemical analysis of exoplanet atmospheres
- Organized spectra from archival and new data sources including the Hubble Space Telescope
- Extended and improve previous analysis completed for MUSCLES collaboration from 15 to 69 stars
- Led effort to publish paper in *The Astronomical Journal* as first-author among international researchers

Summer 2017 **Yale Wright Laboratory**, New Haven, CT

Yale College Dean's Research Fellow

- Collaborated with 300 physicists on Cryogenic Underground Observatory for Rare Events experiment
- Developed new analysis step to compare calibration and simulation data and identify problems
- Coded project in C/C++ through ROOT software system designed for particle physics analysis

Summer 2016 **University of Chile**, Santiago, Chile

Tetelman Fellow for International Research in the Sciences

- Explored relationship between stellar activity and radial velocity data on exoplanets
- Expedited runtime 500% by parallel-processing codes in Python and associated astronomy packages
- Observed exoplanet targets through Swiss Euler 1.2m telescope at La Silla Observatory
- Forged partnership between the universities for future undergraduate research exchanges

Summer 2014 **Boston University**, Boston, MA

Astronomy Research Intern

- Analyzed data from Cerro Tololo Observatory to produce an HR diagram of M Dwarf stars
- Formulated and tested new image processing method to reduce raw astronomical observations

Observing Experience

2019 **W. M. Keck Observatory**, Waimea, HA

Keck I High Resolution Echelle Spectrometer

2016 **La Silla Observatory**, Atacama Desert, Chile

Swiss 1.2 Meter Leonard Euler Telescope

2013 **Kitt Peak National Observatory**, Tucson, AZ

Publications and Presentations

2020 **Melbourne, K.**, Youngblood, A., France, K. et al. "*Estimating the Ultraviolet Emission of M dwarfs with Exoplanets from Ca II and H α* " (doi:10.3847/1538-3881/abf5c)

2020 **Keck Science Meeting** (Poster), Virtual

"Predicting the UV Emission of M dwarfs with Exoplanets from Ca II and H-alpha"

2020 **American Astronomical Society** (Poster), Honolulu, HI

"How to Predict the UV Emission of an M dwarf"

2019 **Extreme Solar Systems IV** (Poster), Reykjavik, Iceland

"Predicting the UV Emission of M dwarfs with Exoplanets from Ca II and H-alpha"

2019 **North Central Region of the Astronomical League Convention**, Moline, IL

"Our Coolest Neighbors: M Dwarfs and the Search for Earth 2.0"

2019 **American Astronomical Society** (Poster), Seattle, WA

"Characterizing the UV Emission of M Dwarfs with Exoplanets"

2018 **Yale Undergraduate Research Association** (Poster), New Haven, CT

First Place: "Characterizing the UV Emission of M Dwarfs with Exoplanets"

2018 **NASA Goddard Space Flight Center Intern Research Fair** (Poster), Greenbelt, MD

First Place: "Characterizing the UV Emission of M Dwarfs with Exoplanets"

2018 **Conference for Undergraduate Women in Physics**, New York City, NY

First Place: "The Effects of Stellar Activity on Radial Velocity Exoplanet Detection"

2017 **American Physical Society Division of Nuclear Physics** (Poster), Pittsburgh, PA

"Analyzing CUORE Data and Geant4 Simulation"

2016 **University of Chile Astronomy Department Professional Seminar**, Santiago, Chile

"The Effects of Stellar Activity on Radial Velocity Exoplanet Detection"

2014 **Research Internship for Science and Engineering Symposium** (Poster), Boston, MA

Outreach and Involvement

- Present **University of Colorado Boulder and Ball Aerospace "Big Sister" Mentor**, Boulder, CO
- Present **Guest speaker at K-12 STEM clubs**, Virtual
- 2020 **Space Generation Fusion Forum Delegate**, Virtual
- 2020 **EMER-GEN Delegate (in conjunction with AMOS Conference)**, Virtual
- 2019 **Space Generation Advisory Council Congress Delegate**, Washington, D.C.
- 2018 – 2019 **Girls Science Investigations Volunteer**, New Haven, CT
- 2017 **Yale Resonance TED Talk Presenter**, New Haven, CT
- 2013 – 2019 **Popular Astronomy Club Member**, Moline, IL
- 2017 **Middle School Science Fair Judge**, Washington, D.C.

Leadership

- 2019 **Kappa Kappa Gamma Zeta Xi Chapter**, New Haven, CT
 - President*
 - Directed board of 16 leaders and their respective committees to run campus chapter of 120 women
 - Resolved disputes and issues raised by members as head of chapter standards committee
 - Represented chapter by corresponding professionally with members, national board, and media
- 2015 – 2018 **Yale Women in Physics**, New Haven, CT
 - Co-President and Secretary General*
 - Mobilized efforts to support and unite women in physics and STEM fields through outreach events
 - Mentored younger students starting their careers in physics about academic opportunities
 - Delegated responsibilities for weekly event management to other board members
 - Facilitated initiative to bring inaugural Schultz Undergraduate Prize visiting lecturer to campus

Special Courses and Skills

- 2019 Brady-Johnson Program in Grand Strategy (Seminar, Research, and Lecture Series Student)
- 2019 Center for Strategic and International Studies Understanding Space Security Course
- Advanced: Python
- Moderate: DOORS, Agile
- Basic: R, C/C++ through ROOT, HTML/CSS

Awards and Grants

- 2019 **Universities Space Research Association Distinguished Undergraduate** (\$5000)
- 2019 **Yale's Brady-Johnson Grand Strategy Program Grant** (\$3100)
- 2019 **Bruce M. Babcock '62 Travel Research Fellowship** (\$1200)
- 2019 **National Space Club and Foundation Keynote Scholarship Finalist**
- 2018 **Women in Aerospace Scholarship in Memory of Molly K. Macauley** (\$2000)
- 2018 **John Mather Nobel Scholar** (\$3000)
- 2017 **Connecticut Space Grant Undergraduate Research Fellowship** (\$5000)
- 2017 **Saybrook Residential College Research Fellowship** (\$545)
- 2017 **Yale College Dean's Research Fellowship** (\$4300)
- 2016 **Horkheimer/Smith First-Place Scholarship for Youth Astronomy Outreach** (\$1750)
- 2016 **Alan S. Tetelman '58 Fellowship for International Research in the Sciences** (\$3200)