

Bryson Cale

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Research Interests

- Detection and characterization of exoplanets primarily via radial velocities.
- Development of general purpose spectral extraction and RV generation codes.
- Characterization of stellar activity through radial velocity measurements.
- Development of mathematical optimization codes for general data science.

Education

- **George Mason University** **Fairfax, VA**
Ph.D., Physics
2017-2021
Areas of Study: Physics & Astronomy. *Advisor:* Peter Plavchan
- **Missouri State University** **Springfield, MO**
Master of Natural and Applied Science, Transferred after one year
2016-2017
Areas of Study: Physics, Astronomy, & Materials Science. Computer Science.
- **Grinnell College** **Grinnell, IA**
Bachelor of Arts
2012-2016
Areas of Study: Double Major in Physics & Mathematics.

Employment

- **NASA Jet Propulsion Laboratory / IPAC** **Pasadena, CA**
NASA Postdoctoral Program (NPP) Fellow
August 2021 - Current
 - Developing a data pipeline for the new diffraction-limited PARVI spectrograph at Mt. Palomar to process raw echelle spectra, generate precise radial velocities, and model orbits.
 - Characterizing PARVI spectra and radial velocity precision.
- **George Mason University** **Fairfax, VA**
Graduate Research Assistant
August 2017 - August 2021
 - Developed codes to search for planets orbiting other stars via the radial velocity technique with a variety of modern echelle spectrographs.
 - Logged > 100 partial nights of observing with the iSHELL spectrograph on the NASA Infrared Telescope Facility as lead observer.
 - Aided in the confirmation of >10 exoplanet candidates identified with the NASA TESS Mission.
- **George Mason University** **Fairfax, VA**
Academic Tutor
August 2017 - May 2021
 - Tutored George Mason University student athletes in physics, calculus, differential equations, linear algebra, and other upper level math, physics, and computer science courses.
- **Missouri State University** **Springfield, MO**
Graduate Teaching Assistant
August 2016 - May 2017
 - Prepared lectures for and instructed students through an introductory astronomy lab course.
 - Resource for NASA Public Observing Nights at MSU's Baker Observatory.
- **Grinnell College** **Grinnell, IA**
Physics Lab Teaching Assistant
September 2015 - December 2015

- Guided students through an introductory physics lab.

Grants and Funding

- George Mason University Physics Department Summer Fellowship (2020), \$7.5K
- NASA Exoplanet Research Program Fellowship (XRP) (Co-I) (2019), 3-year stipend
- George Mason University Physics Department Summer Fellowship (2018), \$6K

Awarded Telescope Time

- **2021B:** WIYN/NEID - Radial Velocity Follow Up of Exoplanet Candidates Orbiting Cool Low Mass Stars Identified With TESS. Co-I.
- **2021B:** IRTF/iSHELL - Radial Velocity Follow Up of Extrasolar Planet Candidates Orbiting Cool Low Mass Stars Identified With TESS. PI.
- **2021A:** IRTF/iSHELL - Radial Velocity Follow Up of Extrasolar Planet Candidates Orbiting Cool Low Mass Stars Identified With TESS. PI.
- **2020B:** HIRES/Keck - Measuring Stellar Activity with Chromatic Radial-Velocities in the Active and Planet-Bearing Nearby M dwarf AU Mic. Co-I.
- **2020B:** CHIRON/CTIO - Measuring Stellar Activity with Chromatic Radial-Velocities in the Active and Planet-Bearing Nearby M dwarf AU Mic. Co-I.
- **2020B:** IRTF/iSHELL - Radial Velocity Follow Up of Extrasolar Planet Candidates Orbiting Cool Low Mass Stars Identified With TESS. PI.
- **2020A:** IRTF/iSHELL - Radial Velocity Follow Up of Extrasolar Planet Candidates Orbiting Cool Low Mass Stars Identified With TESS. PI.
- **2019B:** CHIRON/CTIO - Measuring Stellar Activity with Chromatic Radial-Velocities in the Active and Planet-Bearing Nearby M dwarf AU Mic. Co-I.
- **2019B:** IRTF/iSHELL - RVxTESS: Spectral Studies of M Dwarfs with Simultaneous TESS and IRTF/iSHELL Observations. Co-I.
- **2019B:** IRTF/iSHELL - Radial Velocity Follow-up of Recently Discovered Transiting Planets Orbiting the Young and Active M Dwarf AU Mic. Co-I.
- **2019B:** IRTF/iSHELL - Radial Velocity Follow Up of Extrasolar Planet Candidates Orbiting Cool Low Mass Stars Identified With TESS. PI.
- **2019A:** IRTF/iSHELL - What Lies Beyond the TRAPPIST-1 Snow Line? Constraining Long Period Neptunes with iSHELL Radial Velocity Observations. Co-I.
- **2019A:** IRTF/iSHELL - Hidden Binaries in the Beta Pictoris Moving Group. Co-I.
- **2019A:** IRTF/iSHELL - Zodiacal Exoplanets In Time: Measuring the Masses of Young Exoplanets. PI.
- **2018B:** IRTF/iSHELL - Zodiacal Exoplanets In Time: Measuring the Masses of Young Exoplanets. PI.
- **2017A:** IRTF/iSHELL - What radial velocity precision is obtainable with iSHELL and the isotopic methane gas cell? Co-I.

Publications

- ***Diving Beneath the Sea of Stellar Activity: Chromatic Radial Velocities of the Young AU Mic Planetary System.*** First Author. Submitted for publication in *Astronomical Journal*.
- ***Precise Radial Velocities of Cool Low Mass Stars With iSHELL.*** First Author. Published in *Astronomical Journal*. 2019
- ***Precise Near-Infrared Radial Velocities with iSHELL.*** First Author. White Paper submitted to the National Academies of Science. 2018
- *The Magellan-TESS Survey I: Survey Description and Mid-Survey Results.* Co-author. Submitted to *Astrophysical Journal*. Teske et al.
- *TOI-431/HIP 26013: A Super-Earth and a Sub-Neptune Transiting a Bright, Early K Dwarf, With a Third Planet Candidate.* Co-author. Submitted to *Monthly Notices of the Royal Astronomical Society*. Osborn et al.
- *Precise mass and radius of a transiting super-Earth planet orbiting the M dwarf TOI-1235: a planet in*

- the radius gap? Co-author. *Astronomy & Astrophysics*. Bluhm et al. 2020
- *A planet within the debris disk around the pre-main-sequence star AU Microscopii* Co-author. *Nature*. Plavchan et al. 2020
- *Magnetism and spin-orbit alignment in the young planetary system AU Mic* Co-author. *Astronomy & Astrophysics*. Martioli et al. 2020
- *The CARMENES search for exoplanets around M dwarfs Two planets on the opposite sides of the radius gap transiting the nearby M dwarf LP 729–54*. Co-author. *Astronomy & Astrophysics*. Nowak et al. 2020
- *TOI 442: The CARMENES search for exoplanets around M dwarfs: TOI 442.01=LP714-47b: Populating the Neptune desert*. Co-author. *Astronomy & Astrophysics*. Dreizler et al. 2020
- *A Hot Saturn Orbiting an Oscillating Late Subgiant Discovered By TESS* Co-author. *Astronomical Journal*. Huber et al. 2019
- *TOI 257: A Warm Sub-Saturn on a Moderately Eccentric Orbit*. Co-author. *Monthly Notices of the Royal Astronomical Society*. Addison et al. 2021
- *EarthFinder Report*. NASA probe study report. Co-author. Plavchan et al. 2019
- *Exo-Transmit: An Open-Source Code for Calculating Transmission Spectra for Exoplanet Atmospheres of Varied Composition*. Co-author. *Publications of the Astronomical Society of the Pacific*. Kempton et. al 2017.

Invited Talks

- *iSHELL Data Processing*. PARVI Data Reduction and Tellurics Meeting. December 17, 2020.

Conference Talks

- *2 Years of TESS Follow-up with iSHELL*. Talk. 22nd TESS Science Team Meeting. 2020.
- *Precise NIR RVs of Cool Low Mass Stars with iSHELL*. Talk. Chesapeake Bay Area Exoplanet Meeting. 2020.
- *iSHELL Data Analysis*. Talk. Extreme Precise Radial-Velocities. 2017
- *Precise Radial Velocity First Light Observations With iSHELL*. Session Talk. 229th American Astronomical Society Meeting. 2017

Poster Presentations

- *Precise Near Infrared Radial Velocities with iSHELL*. Poster. 235th American Astronomical Society Meeting. 2020
- *Precise Near Infrared Radial Velocities with iSHELL*. Poster. Sagan Meeting Workshop - *Did I Really Just Find an Exoplanet?*. 2018
- *Precise Near IR Radial Velocity First Light Observations With iSHELL*. Poster. 231st American Astronomical Society Meeting. 2018
- *Transiting Exoplanet Observations at Grinnell College*. Poster. 223rd American Astronomical Society Meeting. 2014

Technical Skills

- **Authored Python Packages:**
 - pychell - <https://pychell.readthedocs.io/en/latest/>
 - Optimize - <https://optimize.readthedocs.io/en/latest/>
- **Programming Languages:**
- Python, Julia, C, JAVA (including Android Dev., LIBGDX), JavaScript/TypeScript (including React.js & JSX markdown, Three.js), IDL, MATLAB, HTML/CSS/PHP, Scheme

- **Other Technologies/Methodologies:** Windows, Mac, & Linux OS, Unix Shells, Systemic Console 2, Git, \LaTeX , Microsoft Office, Google Docs, Streamlit GUI, Jupyter and Pluto Notebooks