

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 general codes for optimization purposes in data science.

Education

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

Employment

- **NASA Jet Propulsion Laboratory / IPAC** **Pasadena, CA**
August 2021 - Current
NASA Postdoctoral Program Fellow
 - Developing a full-fledged pipeline for the new diffraction-limited PARVI spectrograph at Mt. Palomar to process raw data, generate precise radial velocities, and model orbits.
 - Characterizing the PARVI spectra and radial velocity precision.
- **George Mason University** **Fairfax, VA**
August 2017 - August 2021
Graduate Research Assistant
 - 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**
August 2017 - May 2021
Academic Tutor
 - Tutored George Mason Univ. student athletes in physics, calculus, differential equations, linear algebra, and other upper level math, physics, and computer science courses.
- **Missouri State University** **Springfield, MO**
August 2016 - May 2017
Graduate Teaching Assistant
 - 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

- Helped students to understand the fundamentals of physics through lab experiments in an introductory lab course.

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