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**
  Ph.D., Physics, Expected Graduation: May 2021 — *2017-Current*
  Areas of Study: Physics & Astronomy.
- **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

- **George Mason University** — **Fairfax, VA**
  Graduate Research Assistant — *August 2017 - Current*
  - Developing codes to search for planets orbiting other stars via the radial velocity technique with a variety of spectrographs.
  - Logged $>$ 100 partial nights of observing with 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 - Current*
  - Tutor George Mason Univ. student athletes in physics, calculus, differential equations, linear algebra, and other upper level math and physics 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*
  - 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

- **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 - RVx*TESS*: 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

- ***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 ApJ. 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 MNRAS. 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. A&A. 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. A&A. 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. A&A. 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. A&A. Dreizler et al. 2020

- *A Hot Saturn Orbiting an Oscillating Late Subgiant Discovered By TESS* Co-author. AJ. Huber et al. 2019
- *TOI 257: A Warm Sub-Saturn on a Moderately Eccentric Orbit*. Co-author. MNRAS, responding to referees. Addison et al. 2020
- *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. PASP. 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. 22^{nd} 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/`
  - `Robust Nelder Mead` - `https://robust-nelder-mead.readthedocs.io/en/latest/`
  - `Optim Parameters` - `https://optimparameters.readthedocs.io/en/latest/`
- **Programming Languages:** Python, Julia, IDL (Interactive Data Language), MATLAB, C, Java (including Android Dev., LIBGDX), HTML/CSS/PHP, JavaScript (including React.js, Three.js), TypeScript, 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