

# Peter S. Ferguson | CV

Department of Physics – University of Wisconsin Madison

🌐 [peterferguson.space](http://peterferguson.space)

✉ [peter.ferguson@wisc.edu](mailto:peter.ferguson@wisc.edu)

🌐 [psferguson](#)

## RESEARCH INTERESTS

---

Observational Cosmology  
Variable Stars

Milky Way (Sub)structure  
Large Scale Surveys

Dark Matter  
Instrumentation

Tidal Streams  
Science Validation

## EDUCATION

---

**Ph.D. in Astrophysics** 2021

**M.S. in Astrophysics** 2019

Texas A&M University

Science: Jennifer Marshall & Louis Strigari

Instrumentation: Darren DePoy

**B.S. in Astrophysics** 2013

Haverford College

## APPOINTMENTS

---

2021-Present	Postdoctoral Research Associate: Rubin Observatory commissioning / Observational cosmology with Keith Bechtol	UW Madison
2020-2021	Universities Research Association (URA) Visiting Scholar	Fermilab
2016-2021	Graduate Research Assistant: Astronomy	Texas A&M
2016-2021	Graduate Research Assistant: Instrumentation	Texas A&M

## Publications

---

Orcid: [0000-0001-6957-1627](https://orcid.org/0000-0001-6957-1627) | ADS Library: [Link](#)

### Primary Contributor

---

A. Drlica-Wagner, **P.S. Ferguson**, et. al., *The DECam Local Volume Exploration Survey Data Release 2*, 2022, **ApJS**, **261**, **2**

**P.S. Ferguson**, N. Shipp, A. Drlica-Wagner, T.S. Li, et. al., *DELVE-ing into the Jet: a thin stellar stream on a retrograde orbit at 30 kpc*, 2022, **AJ**, **163**, **1**

K. Tavangar, **P.S. Ferguson**, N. Shipp, et. al., *From the Fire: A Deeper Look at the Phoenix Stream* 2022, **Accepted to AASJ**

A. Drlica-Wagner, J. L. Carlin, D. L. Nidever, **P. S. Ferguson** et. al., *The DECam Local Volume Exploration Survey: Overview and First Data Release*, 2021, **AJSS**, **256**, **1**

**P.S. Ferguson**, L.E. Strigari, *Exploring the 3D structure of the Sagittarius dSph using RR-Lyrae*, 2020, **MNRAS**, **495**, **4**

N. Shipp, A. Drlica-Wagner, E. Balbinot, **P. Ferguson**, et. al., *Stellar Streams Discovered in the Dark Energy Survey*, 2018, **ApJ**, **862**, **114**

## Co-Author

W. Cerny, C. E. Martínez-Vázquez, A. Drlica-Wagner, ..., **P. S. Ferguson**, et. al., *Six More Ultra-Faint Milky Way Companions Discovered in the DECam Local Volume Exploration Survey*, 2022, **Submitted to AAS Journals**

W. Cerny, J.D. Simon, T.S. Li, ..., **P. S. Ferguson**, et. al., *Pegasus IV: Discovery and Spectroscopic Confirmation of an Ultra-Faint Dwarf Galaxy in the Constellation Pegasus*, 2022, **Submitted to AAS Journals**

T. S. Li, A. Ji, A. B. Pace, ..., **P. S. Ferguson**, et. al., *S<sup>5</sup>: The Orbital and Chemical Properties of One Dozen Stellar Streams*, 2022, **ApJ, 928, 1**

C. E. Martínez-Vázquez, W. Cerny, A.K. Vivas, ..., **P. S. Ferguson**, et. al., *RR Lyrae Stars in the Newly Discovered Ultra-faint Dwarf Galaxy Centaurus I*, 2021, **AJ 162, 6**

N. Shipp, D. Erkal, A. Drlica-Wagner, ..., **P. S. Ferguson**, et. al., *Measuring the Mass of the Large Magellanic Cloud with Stellar Streams Observed by S<sup>5</sup>*, 2021 **ApJ 923, 2**

W. Cerny, A. B. Pace, and A. Drlica-Wagner, ..., **P. S. Ferguson**, et. al., *Eridanus IV: an Ultra-faint Dwarf Galaxy Candidate Discovered in the DECam Local Volume Exploration Survey*, 2021, **ApJ, 920, 2**

K. M. Stringer, A. Drlica-Wagner, L. Macri, ..., **P. S. Ferguson**, et. al., *Identifying RR Lyrae Variable Stars in Six Years of the Dark Energy Survey*, 2021, Submitted to AAS Journals, **arXiv:2011.13930**

W. Cerny, A. B. Pace, A. Drlica-Wagner, **P. S. Ferguson**, et. al., *Discovery of an Ultra-Faint Stellar System near the Magellanic Clouds with the DECam Local Volume Exploration (DELVE) Survey*, 2021, **ApJ, 910, 18**

T. T. Hansen, A. H. Riley, L. E. Strigari, J. L. Marshall, **P. S. Ferguson**, J. Zepeda, and C. Sneden, *A Chemo-dynamical Link between the Gjöll Stream and NGC 3201*, 2020, **ApJ, 901, 23**

T. T. Hansen, J. L. Marshall, J. D. Simon, ..., **P. S. Ferguson**, et. al., *Chemical Analysis of the Ultra-Faint Dwarf Galaxy Grus II. Signature of high-mass stellar nucleosynthesis*, 2020, **ApJ, 897, 183**

S. Mau, W. Cerny, A. B. Pace, ..., **P. S. Ferguson**, et.al., *Two Ultra-Faint Milky Way Stellar Systems Discovered in Early Data from the DECam Local Volume Exploration Survey*, 2020, **ApJ, 890, 136**

K. M. Stringer, J. P. Long, L. M. Macri, ..., **P. S. Ferguson**, et.al., *Identification of RR Lyrae stars in multiband, sparsely-sampled data from the Dark Energy Survey using template fitting and Random Forest classification*, 2019, **AJ, 158, 16**

## SPIE

L. P. Guy, K. Bechtol, J. L. Carlin, E. Dennihy, **P. S. Ferguson**, et. al., *Faro: A framework for measuring the scientific performance of petascale Rubin Observatory data products*. 2022, **Proceedings of the SPIE, Volume 12189**

**P. S. Ferguson**, L. Barba, D. L. DePoy, L. M. Schmidt, J. L. Marshall, et. al., *Further development and testing of TCal: a mobile spectrophotometric calibration unit for astronomical imaging systems*. 2020, **Proceedings of the SPIE, Volume 11447**

**P. S. Ferguson**, D. L. DePoy, L. Schmidt, J. L. Marshall, et. al., *Development of TCal: a mobile spectrophotometric calibration unit for astronomical imaging systems*, 2018, **Proceedings of the SPIE, Volume 107023A**

## Talks/Posters

---

### Invited

---

- 2022 “*Adventures in Calibration-land*”, DELVE Collaboration Meeting Talk
- 2022 “*Calibration of the DELVE survey*”, DESC Photometric Corrections Working Group Talk
- 2021 “*Using streams and surveys to constrain dark mater power spectrum*”,  
Observational Cosmology group UW Madison Talk
- 2021 “*DELVE-ing into the Jet*”, University of Chicago *Funch* presentation Talk
- 2021 “*The Messy Side of the Milky Way: using large surveys to explore our Galaxy’s halo*”,  
Texas A&M University Joint Nuclear and Astrophysics Seminar Talk
- 2020 “*Stellar Streams in DELVE*”,  
DECam Local Volume Exploration (DELVE) Survey Collaboration Meeting Talk
- 2020 “*Milky Way working group activities*”,  
Dark Energy Survey(DES) Collaboration Meeting Talk

### Contributed

---

- 2022 “*Calibration of the DELVE survey*”, DESC Collaboration Meeting Talk
- 2021 “*The Jet stream in DELVE*”  
Texas Section of the American Physical Society (TSAPS), virtual Talk
- 2021 “*The Jet stream in DELVE*”  
Streams21: Constraints on Dark Matter, Virtual Talk
- 2020 “*Further development and testing of TCal: a mobile spectrophotometric calibration unit for astronomical imaging systems*”, SPIE Astronomical Telescopes + Instrumentation, Virtual Poster
- 2019 “*Exploring the 3D structure of the Sagittarius dSph core using RR Lyrae*”  
RRL/Cepheid, Cloudcroft, NM Talk
- 2019 “*Constraining the 3D structure of the Sagittarius dwarf galaxy using RR-Lyrae and simple hierarchical Bayesian modeling*” Workshop on Astronomy & Statistics, Texas A&M University Talk
- 2018 “*RR-Lyrae in the Dark Energy Survey*”, Near-Field Cosmology with the Dark Energy Survey’s DR1 and Beyond, Kavali Institute for Cosmological Physics, University of Chicago Talk
- 2018 “*TCal: a mobile spectrophotometric calibration unit for astronomical imaging systems*”  
SPIE Astronomical Telescopes + Instrumentation, Austin, Tx. Poster
- 2017 “*K2F2: Two new medium K-band filters on FLAMINGOS-2 at Gemini South*”  
Frank N. Bash Symposium, The University of Texas at Austin Poster

## SCIENTIFIC COLLABORATIONS

---

- 2018-present *DECam Local Volume Exploration (DELVE) Survey* [<https://delve-survey.github.io>]  
*Builder*: DELVE is a 3-year survey combining archival DECam data with 126 nights of dedicated observing. This survey looks to probe the small scale nature of dark matter by (1) searching for ultra faint MW satellites and stellar streams, (2) studying the satellite population and star formation history around the Large and Small Magellanic Clouds, and (3) deeply imaging

around isolated Large Magellanic Cloud analogs to determine their satellite luminosity function. I have contributed to much of the calibration pipeline, data validation, and morphological classifier for our first data release DELVE-DR1 in early 2021.

- 2021-Present *Vera Rubin Observatory*: As part of the Data Management Science Verification and Validation (DM-SVV) team I am one of the developers of `analysis_tools` [[https://github.com/lst/analysis\\_tools](https://github.com/lst/analysis_tools)], additionally I am an active member of the Systems Integration and Commissioning (SITCOM) team, where I am the science lead for the commissioning science unit focused on object detection, quality flags, verification & validation sample production, and survey property maps.
- 2021-Present *Dark Energy Science Collaboration (LSST-DESC)* [<https://lsstdesc.org/>]  
*Member*: Acting as a bridge between the Vera Rubin Observatory project and DESC to assist the Photometric Corrections, Science Release and Validation, and Commissioning working groups.  
*Dark Matter Working Group Convener*: Starting in Jan 2023 I am one of two conveners for this working group within DESC
- 2016-present *Dark Energy Survey (DES)* [<https://www.darkenergysurvey.org>]  
*Member of Milky Way working group*: DES is a photometric survey over 5,000 deg in *griz*-bands to a depth of 24th mag. I have contributed to validation of DES catalogs, and analyses looking for dwarf galaxies, stellar streams, and RR Lyrae in the DES datasets.
- 2020-present Southern Stellar Stream Spectroscopic Survey ( $S^5$ ) [<https://s5collab.github.io/>]  
*Member*:  $S^5$  is a spectroscopic survey run out of AAT to obtain spectra of stellar streams discovered in DES. I have contributed to target selection and determining stream membership probability of stars with 6D kinematic observations.

## PROPOSALS

---

Below are the successful observing proposals I have been the PI for.

- 2022 *Probing the Milky Way using DECam and stellar streams*  
DECam 2023A (2.5 nights of observations)
- 2022 *Probing the Milky Way using DECam and stellar streams*  
DECam 2022B (3.5 nights of observations)
- 2019 *Probing the Dynamical Structure of Sagittarius*  
VLT/FLAMES cycle 105 (0.5 nights of observations pushed to 2021 due to COVID)
- 2019 *Probing the Dynamical Structure of Sagittarius*  
Gemini south 2020A (18 hours of observations not taken due to COVID)

## OBSERVING EXPERIENCE

---

<b>Cerro Tololo Interr-American Observatory</b> Chile – Blanco 4-meter telescope Used DECam both in person and remotely	14 nights
<b>McDonald Observatory</b> TX, USA – Harlan Smith 2.7-meter telescope Used Tull coudé Echelle Spectrograph for R-Process Alliance Observing	20 nights

**Gemini South:** Chile – 8-meter telescope  
Commissioned 2 new filters on FLAMINGOS-2

3 nights

**Gemini North:** HI, USA – 8-meter telescope  
Operated Queue as part of work at Gemini

3 nights

## AWARDS

---

2021 Spring TSAPS outstanding talk by a graduate student

2020 Fall TSAPS outstanding talk by a graduate student

2020 URA Visiting Scholar at Fermilab award (Sponsor: Alex Drlica-Wagner)

## MENTORING

---

2022- Kyle Boone: Mr. Boone, a physics major at UW Madison, has worked on using synthetic source injection (Balrog) and survey property maps to generate stellar weight maps for DES analyses.

2020-2021 Kiyon Tavanagar: Mr. Tavanagar, an astrophysics major at University of Chicago, has worked on characterizing stellar streams found in DES.

2018-2021 Leo Barba: Mr. Barba, a physics major at Texas A&M, has worked 3D printing and designing parts for TCal as well as helping to set up and run the instrument. Currently astronomy graduate student at SDSU.

2018 Sarah Hughes: Ms. Hughes, an REU student at Texas A&M, helped to design the LabView based software used to run TCal.