

Peter S. Ferguson — CV

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RESEARCH INTERESTS

Observational Cosmology Photometric Calibration	Milky Way (Sub)structure Large Scale Surveys	Dark Matter Instrumentation	Tidal Streams Science Validation
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APPOINTMENTS

Sep. 2024-Present	DiRAC Postdoctoral Fellow, DiRAC institute	U. of Washington Seattle
2021-2024	Postdoctoral Research Associate Rubin Observatory commissioning/Observational cosmology	U. of Wisconsin Madison
2020-2021	Universities Research Association (URA) Visiting Scholar	Fermilab
2016-2021	Graduate Research Assistant: Astronomy & Instrumentation	Texas A&M

EDUCATION

Ph.D. in Astrophysics Texas A&M University Science: Jennifer Marshall & Louis Strigari	Instrumentation: Darren DePoy	2021
B.S. in Astrophysics Haverford College		2013

SCIENTIFIC COLLABORATIONS

2021-Present *Vera Rubin Observatory*: I am an in-kind contributor making significant contributions to many areas of the commissioning process. A few highlights:

- System Integration, Test, and Commissioning (SITCOM): I am one of the core members of the data analysis team helping provide rapid analysis of commissioning efforts (recently the telescope mount and main mirror cells). Additionally, I am helping to develop the tools we will use for the rest of commissioning. I have spent the last 6 months in Chile working closely with the construction team and acting as a volunteer observing specialist.
- Science Verification and Validation (SVV): I have led ad-hoc analyses of Aux-Tel data, been a developer for `analysis_tools` the metric framework for the Rubin Science Pipeline, helped to develop the science validation surveys for commissioning, and am the science lead for the commissioning science unit focused on object detection, quality flags, verification & validation sample production, and survey property maps.
- Data Management (DM): I am one of the core members creating `the_monster` an all sky reference catalog to bootstrap photometric calibrations for early operations. I also can process data and develop code for the rubin science pipelines.

- 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: I am one of two conveners for this working group within DESC
- 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.
- 2016-present *Dark Energy Survey (DES)* [<https://www.darkenergysurvey.org>]
- 2020-present *Southern Stellar Stream Spectroscopic Survey (S^5)* [<https://s5collab.github.io/>]

Publications

Orcid: **0000-0001-6957-1627** — ADS Library: **Link**

Primary Contributor (8)

Tsiane, Kabelo, Mau, Sidney, Drlica-Wagner, Alex, ..., **Ferguson, P. S.**, et al., *Predictions for the Detectability of Milky Way Satellite Galaxies and Outer-Halo Star Clusters with the Vera C. Rubin Observatory*, **The Open Journal of Astrophysics**, 2025

Li, Ting S., Ji, Alexander P., Pace, Andrew B., ..., **Ferguson, P. S.**, et al., *S^5 : The Orbital and Chemical Properties of One Dozen Stellar Streams*, **ApJ**, 2022

Ferguson, P. S., Shipp, N., Drlica-Wagner, A., et al., *DELVE-ing into the Jet: A Thin Stellar Stream on a Retrograde Orbit at 30 kpc*, **AJ**, 2022

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

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

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

Ferguson, P. S., Strigari, Louis E., *Three-dimensional structure of the Sagittarius dwarf spheroidal core from RR Lyrae*, **MNRAS**, 2020

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

Co-Author (23)

- Medoff, Jonah, Mutlu-Pakdil, Burçin, Carlin, Jeffrey L., ..., **Ferguson, P. S.**, et al., *DELVE-DEEP Survey: The Faint Satellite System of NGC 55*, **ApJ**, 2025
- Pace, Andrew B., Li, T. S., Ji, A. P., ..., **Ferguson, P. S.**, et al., *Spectroscopic Analysis of Pictor II: a very low metallicity ultra-faint dwarf galaxy bound to the Large Magellanic Cloud*, **The Open Journal of Astrophysics**, 2025
- Tan, C. Y., Cerny, W., Drlica-Wagner, A., ..., **Ferguson, P. S.**, et al., *A Pride of Satellites in the Constellation Leo? Discovery of the Leo VI Milky Way Satellite Ultra-faint Dwarf Galaxy with DELVE Early Data Release 3*, **ApJ**, 2025
- Cerny, W., Chiti, A., Geha, M., ..., **Ferguson, P. S.**, et al., *Discovery and Spectroscopic Confirmation of Aquarius III: A Low-mass Milky Way Satellite Galaxy*, **ApJ**, 2025
- Martinez, Michael N., Gordon, Yjan A., Bechtol, Keith, ..., **Ferguson, P. S.**, et al., *Finding Lensed Radio Sources with the Very Large Array Sky Survey*, **ApJ**, 2025
- Teixeira, G., Bom, C. R., Santana-Silva, L., ..., **Ferguson, P. S.**, et al., *Photometric redshifts probability density estimation from recurrent neural networks in the DECam local volume exploration survey data release 2*, **Astronomy and Computing**, 2024
- Chiti, Anirudh, Mardini, Mohammad, Limberg, Guilherme, ..., **Ferguson, P. S.**, et al., *Enrichment by extragalactic first stars in the Large Magellanic Cloud*, **Nature Astronomy**, 2024
- Usman, Sam A., Ji, Alexander P., Li, Ting S., ..., **Ferguson, P. S.**, et al., *Multiple populations and a CH star found in the 300S globular cluster stellar stream*, **MNRAS**, 2024
- McNanna, M., Bechtol, K., Mau, S., ..., **Ferguson, P. S.**, et al., *A Search for Faint Resolved Galaxies Beyond the Milky Way in DES Year 6: A New Faint, Diffuse Dwarf Satellite of NGC 55*, **ApJ**, 2024
- Zaborowski, E. A., Drlica-Wagner, A., Ashmead, F., ..., **Ferguson, P. S.**, et al., *Identification of Galaxy-Galaxy Strong Lens Candidates in the DECam Local Volume Exploration Survey Using Machine Learning*, **ApJ**, 2023
- Cerny, W., Drlica-Wagner, A., Li, T. S., ..., **Ferguson, P. S.**, et al., *DELVE 6: An Ancient, Ultra-faint Star Cluster on the Outskirts of the Magellanic Clouds*, **ApJ**, 2023
- Cerny, W., Martínez-Vázquez, C. E., Drlica-Wagner, A., ..., **Ferguson, P. S.**, et al., *Six More Ultra-faint Milky Way Companions Discovered in the DECam Local Volume Exploration Survey*, **ApJ**, 2023
- Gordon, Yjan A., O'Dea, Christopher P., Baum, Stefi A., ..., **Ferguson, P. S.**, et al., *Compact Steep Spectrum Radio Sources with Enhanced Star Formation Are Smaller Than 10 kpc*, **ApJ**, 2023
- Cerny, W., Simon, J. D., Li, T. S., ..., **Ferguson, P. S.**, et al., *Pegasus IV: Discovery and Spectroscopic Confirmation of an Ultra-faint Dwarf Galaxy in the Constellation Pegasus*, **ApJ**, 2023
- Martínez-Vázquez, C. E., Cerny, W., Vivas, A. K., ..., **Ferguson, P. S.**, et al., *RR Lyrae Stars in the Newly Discovered Ultra-faint Dwarf Galaxy Centaurus I*, **AJ**, 2021
- Shipp, Nora, Erkal, Denis, Drlica-Wagner, Alex, ..., **Ferguson, P. S.**, et al., *Measuring the Mass of the Large Magellanic Cloud with Stellar Streams Observed by S^5* , **ApJ**, 2021
- Cerny, W., Pace, A. B., Drlica-Wagner, A., ..., **Ferguson, P. S.**, et al., *Eridanus IV: an Ultra-faint Dwarf Galaxy Candidate Discovered in the DECam Local Volume Exploration Survey*, **ApJ**, 2021

Stringer, K. M., Drlica-Wagner, A., Macri, L., ..., **Ferguson, P. S.**, et al., *Identifying RR Lyrae Variable Stars in Six Years of the Dark Energy Survey*, **ApJ**, 2021

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

Hansen, T. T., Riley, A. H., Strigari, L. E., ..., **Ferguson, P. S.**, et al., *A Chemo-dynamical Link between the Gjöll Stream and NGC 3201*, **ApJ**, 2020

Hansen, T. T., Marshall, J. L., Simon, J. D., ..., **Ferguson, P. S.**, et al., *Chemical Analysis of the Ultrafaint Dwarf Galaxy Grus II. Signature of High-mass Stellar Nucleosynthesis*, **ApJ**, 2020

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

Stringer, K. M., Long, J. P., Macri, L. M., ..., **Ferguson, P. S.**, et al., *Identification of RR Lyrae Stars in Multiband, Sparsely Sampled Data from the Dark Energy Survey Using Template Fitting and Random Forest Classification*, **AJ**, 2019

SPIE (7).....

Rodeghiero, Gabriele, Rosignoli, Luca, Canestrari, Rodolfo, ..., **Ferguson, P. S.**, et al., *The Vera C. Rubin's M2 support system integration and verification at the TMA*, **SPIE**, 2024

Ferguson, P. S., Barba, L., DePoy, D. L., et al., *Further development and testing of TCal: a mobile spectrophotometric calibration unit for astronomical imaging systems*, **SPIE**, 2020

Ferguson, P. S., DePoy, D. L., Schmidt, L., et al., *Development of TCal: a mobile spectrophotometric calibration unit for astronomical imaging systems*, **SPIE**, 2018

Unrefereed (3).....

Ferguson, P. S., Rykoff, Eli S., Carlin, Jeffrey L., et al., *The Monster: A reference catalog with synthetic ugrizy-band fluxes for the Vera C. Rubin observatory*, **DMTN**, 2025

Carlin, Jeffrey L., **Ferguson, P. S.**, Vivas, A. Katherina, et al., *An Outer-disk SX Phe Variable Star in Rubin Data Preview 1*, **Research Notes of the American Astronomical Society**, 2025

Ferguson, P. S., Shipp, Nora, *The DECam Field of Streams: a deep view of the Milky Way halo*, **arXiv/2506.05469**, 2025

Selected Talks/Posters

Invited.....

- 2025 "*Unveiling Dark Matter with Dwarfs and Stellar Streams in the Era of Roman & Rubin*",
Cosmic Cartography With Roman Space Telescope Talk
- 2025 "*Unveiling dark matter in the near-field from present (DES) and future (LSST) cosmological surveys*",
AAS 245 DES-DESC splinter session Talk
- 2024 "*Seeking the nature of dark matter with the Milky Way halo and wide-field photometric surveys*",
Astronomy Colloquium, University of Washington Talk
- 2024 "*LSST Overview*",
Dwarf Galaxies, Stellar Clusters and Streams in the LSST era, Chicago, IL Talk
- 2024 "*Seeking the nature of dark matter with the Milky Way halo and wide-field photometric surveys*",
Cosmology Seminar at Carnegie Mellon University, Pittsburgh, PA Talk
- 2024 "*Seeking the nature of dark matter with the Milky Way halo and wide-field photometric surveys*",
Astronomy Seminar, Dartmouth, NH Talk
- 2024 "*Seeking the nature of dark matter with the Milky Way halo*",
MiFA Colloquium, Minneapolis, MN Talk
- 2023 "*Seeking the nature of dark matter with the Milky Way halo*",
Noirlab South Colloquium, La Serena Chile Talk
- 2023 "*Plenary talk on dark matter working group*", Remote, DESC spring meeting Talk
- 2023 "*Seeking the nature of dark matter with the Milky Way halo*",
UW Madison Astronomy Colloquium Talk
- 2022 "*Calibration of the DELVE survey*", DESC Photometric Corrections Working Group Talk

Contributed.....

- 2025 "*Searching for semi-resolved dwarfs in the era of LSST with Synthetic Source Injection (SSI)*",
Galactic Frontiers II Poster
- 2023 "*Dark Matter with Rubin Observatory*", PCW Session organizer
- 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
Texas A&M Astronomy Symposium 25 Aug. 2018
Talk: *TCal: a mobile spectrophotometric calibration unit for astronomical imaging systems*
Texas A&M University, College Station, TX
- 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

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

- Rubin Observatory** Simonyi Survey Telescope 15 nights
Assisting comissioning and integration efforts
- Cerro Tololo Interr-American Observatory** Chile – Blanco 4-meter telescope 14 nights
Used DECam both in person and remotely
- McDonald Observatory** TX, USA – Harlan Smith 2.7-meter telescope 20 nights
Used Tull coudé Echelle Spectrograph for R-Process Alliance Observing
- Gemini South:** Chile – 8-meter telescope 3 nights
Commissioned 2 new filters on FLAMINGOS-2
- Gemini North:** HI, USA – 8-meter telescope 3 nights
Operated Queue as part of work at Gemini

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

- 2022-2025 Kyle 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. Kyle is now a grad student at Harvard.
- 2023-2024 Miranda Gorsuch, a physics PhD student at UW Madison, has worked on data analysis for LSST commissioning.
- 2020-2021 Kiyon Tavanagar, an astrophysics major at University of Chicago, has worked on characterizing stellar streams found in DES. Kiyon is currently a graduate student at Columbia.
- 2018-2021 Leo 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 UMass Amherst.
- 2018 Sarah Hughes, an REU student at Texas A&M, helped to design the LabView based software used to run TCal.