Peter S. Ferguson | CV

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RESEARCH INTERESTS

Observational Cosmology	Milky Way (Sub)structure	Dark Matter	Tidal Streams
Variable Stars	Large Scale Surveys	Instrumentation	Spatial Statistics

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** | 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, 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^5*: The Orbital and Chemical Properties of One Dozen Stellar Streams*, 2022, **Accepted to ApJ**

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* ^{5}, 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 "*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

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-SRV) team I am the core developers of `faro` [https://github.com/lsst/faro], additionally I am an active member of the Systems Integration and Commissioning (SITCOM)

team helping to develop infrastructure to enable successful commissioning of the Vera Rubin Observatory.

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.

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 $grizY$-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 ($\mathcal{S}^5$) [https://s5collab.github.io/]
Member: $\mathcal{S}^5$ 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 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

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- 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 Kiyan 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.