# O. Grace Telford, PhD

Postdoctoral Researcher

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## Summary

• Astrophysicist with interests in massive stars, feedback from star formation, and galactic outflows and how those processes shape galaxies over cosmic time.

• Research experience in both observations and modeling spanning a wide range of spatial scales, from individual stars to large galaxy survey datasets.

• Interdisciplinary background including training in data science and bioengineering. Integrating data management and visualization techniques into astrophysical analyses.

• Experienced instructor and research mentor committed to outreach and inclusion.

## Education

**University of Washington**

Ph.D. in Astronomy with Specialization in Advanced Data Science 2019
*Thesis: "Using Metals and Stars to Constrain Galaxies' Past Gaseous Inflows and Outflows"*
*Advisors: Julianne Dalcanton and Jessica Werk*
*Data science coursework: machine learning, database management, data visualization*

M.S. in Astronomy 2014

**University of Pittsburgh**

B.S. in Physics and Astronomy 2013
*Advisor: Jeffrey Newman*

B.S.E. in Bioengineering with Signals & Imaging Concentration 2013
*Senior Design project: "TissueTouch Pressure Sensor for Medical Training Simulators"*
*Advisor: Joseph Samosky*

## Academic Positions

**Rutgers University**

Postdoctoral Researcher 2019 –
*Advisor: Kristen McQuinn*

**University of Washington**

NSF Graduate Research Fellow 2016 – 2019
NSF Big Data IGERT Fellow 2014 – 2016
Teaching Assistant 2013 – 2014

**University of Pittsburgh**
Undergraduate Researcher in Physics & Astronomy 2010 – 2013
Undergraduate Researcher at the Simulation & Medical Technology Center 2009 – 2012

**National Solar Observatory**
NSF REU Student (Sunspot, NM) 2010
*Advisor: Stephen Keil*

## Awarded Grants

PI of *Hubble Space Telescope* Cycle 28 AR Proposal 16155 2020
"Do Starbursts Form Cored Density Profiles in Dwarf Galaxies?"
Approved funding: $158k

Co-I of *Hubble Space Telescope* Cycle 28 AR Proposal 16144 2020
"A Census of Metals in Low-Mass Galaxies: Quantifying the Metal Retention as a Function of Mass"
PI: K. McQuinn

Co-I of *Hubble Space Telescope* Cycle 27 GO Proposal 16048 2019
"Extremely Metal Poor Galaxies: Understanding the Boundaries of Galaxy Evolution"
PI: K. McQuinn

## Successful Ground-Based Observing Proposals

PI of NASA Keck Observatory Proposal 2021
"Metal-Poor Massive Stars in Nearby Galaxies: a Rosetta Stone for Interpreting Observations in the Epoch of Reionization"
1 night

Co-I of NASA Keck Observatory Proposal 2020
"Constraining the stellar astrophysics that powered cosmic reionization with KCWI"
1 night; PI: J. Chisholm

Co-I of Gemini Observatory Proposal 2020
"Jumping Off the Upper-End: Constraining the mass-loss rates of the most massive stars in the universe with infrared spectroscopy"
13.7 hours; PI: J. Chisholm

Co-I of McDonald Observatory Proposal 2020
"What powered cosmic reionization? A sample of low-metallicity Local Group massive stars to test the source of reionization"
3 nights; PI: J. Chisholm

## Refereed Publications

**Summary statistics from ADS (June 2021):**
**8 astrophysics papers with an h-index of 6 and 2734 total citations**

First-Author Papers (3):

"Mass-to-Light Ratios of Spatially Resolved Stellar Populations in M31"
**Telford, O. G.**, Dalcanton, J., Williams, B., Bell, E., Dolphin, A., Durbin, M., and Choi, Y. 2020, ApJ, 891, 32

"Spatially Resolved Metal Loss from M31"
**Telford, O. G.**, Werk, J., Dalcanton, J., and Williams, B. 2019, ApJ, 877, 120

"Exploring Systematic Effects in the Relation between Stellar Mass, Gas Phase Metallicity, and Star Formation Rate"
**Telford, O. G.**, Dalcanton, J., Skillman, E., and Conroy, C. 2016, ApJ, 827, 35

Contributing-Author Papers (6):

"Star Formation Histories from Spectral Energy Distributions and Color-magnitude Diagrams Agree: Evidence for Synchronized Star Formation in Local Volume Dwarf Galaxies over the Past 3 Gyr"
Olsen, C., Gawiser, E., Iyer, K., McQuinn, K., Johnson, B., **Telford, O. G.**, Wright, A., Broussard, A., and Kurczynski, P. 2021, ApJ, 913, 45

"Gaussian Mixture Models Use-Case: In-Memory Analysis with Myria"
Maas, R., Hyrkas, J., **Telford, O. G.**, Balazinska, M., Connolly, A., and Howe, B. 2015 *Proceedings of the 3rd Very Large Databases Workshop on In-Memory Data Management*
(Not reflected in ADS statistics. 11 total citations.)

"CANDELS Visual Classifications: Scheme, Data Release, and First Results"
Kartaltepe, J. ***et al.*** 2015, ApJS, 221, 11

"The host galaxies of X-ray selected active galactic nuclei to z = 2.5: Structure, star formation, and their relationships from CANDELS and Herschel/PACS"
Rosario, D., ***et al.*** 2015, A&A, 573, A85

"CANDELS: The Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey – The Hubble Space Telescope Observations, Imaging Data Products, and Mosaics"
Koekemoer, A., ***et al.*** 2013, ApJS, 197, 36

"CANDELS: The Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey"
Grogin, N., ***et al.*** 2013, ApJS, 197, 35

## Teaching & Mentoring

Research Advisor to Rutgers University Undergraduate 2019 – 2021

Graduate of the *James Webb Space Telescope* Proposal Tools Master Class 2019 – 2020
- Attended intensive training on *JWST* observing modes and proposal tools
- Organized workshop at Rutgers attended by 30 participants from 3 institutions

Research Advisor to University of Washington Undergraduates 2017 – 2018
- Mentored two students in the Pre-Major in Astronomy Program (Pre-MAP)

Instructor and Assistant at Software Carpentry Workshops 2017 – 2018
- Taught Python, Linux, Git, and GitHub

Guest Lecturer for the Pre-MAP Seminar at University of Washington 2015 – 2017
- Overview of undergraduate research opportunities and how to apply for REUs

Teaching Assistant at University of Washington 2013 – 2014
- Astronomy 101 (Introduction to Astronomy) – Instructor: Bruce Balick
- Astronomy 150 (The Planets) – Instructor: Toby Smith

## Selected Talks

Invited Talks:

"Mass-to-Light Ratios of Spatially Resolved Stellar Populations in M31," Galread Seminar — March 2021, Princeton University

"The Andromeda Galaxy as a Benchmark for Interpretation of Distant Galaxy Observations," Cosmology-Galaxy-IGM Seminar — November 2020, UC Santa Cruz

"Stellar Mass-to-Light Ratios in the Andromeda Galaxy" Galaxy Crawl Talk — April 2020, University of Arizona

"The Andromeda Galaxy as a Benchmark for Interpretation of Distant Galaxy Observations," Astrophysics Seminar — April 2020, McMaster University

"Using Metals and Stars to Constrain Galaxies' Past Gaseous Inflows and Outflows," Astrophysics Seminar — October 2019, Rutgers University

"Spatially Resolved Metal Loss from M31" Extragalactic Seminar — February 2019, UT Austin

"Spatially Resolved Metal Loss from M31" Astronomy Tea Talk — December 2018, Caltech

"Spatially Resolved Metal Loss from M31" Journal Club Seminar — December 2018, UC San Diego

"Using Metals to Constrain the History of Gas Flows in Galaxies" November 2018
Friday Lunch Time Astrophysics Seminar UC Santa Cruz

"The History of Metal Production and Loss in the M31 Disk" October 2018
Astronomy Seminar Columbia University

Contributed Conference Talks:

"FUV Spectra of Main-Sequence O Stars at Extremely Low Metallicity" May 2021
IAUS 361 Virtual Preview: Massive Stars Near and Far Ballyconnell, Ireland

"The History of Metal Production and Ejection in the Spiral Galaxy M31" October 2020
The Rise of Metals and Dust in Galaxies Marseille, France

"Using Metals to Constrain the History of Gas Flows in Galaxies" January 2019
American Astronomical Society # 233 Seattle, WA

"The Spatially Resolved Metal Production and Ejection History in M31" June 2018
Astrophysical Frontiers in the Next Decade and Beyond Portland, OR

## Professional Service & Inclusion Work

External Panelist for *Hubble Space Telescope* 2020

Active member of Rutgers Minorities in Physics & Astronomy (MiPA) group 2019 – 2020
- Founding co-organizer of Equity & Inclusion Journal Club

Referee for Astronomy & Astrophysics 2016

Organizer of Prospective Graduate Student Visits at University of Washington 2015 – 2016

Active member of University of Washington EquiTea group 2014 – 2018

Organizer of Lab Tours for the Pre-Major in Astronomy Program 2014 – 2017
- Cohort-building activity with the aim of exposing students from underrepresented backgrounds to research opportunities on the University of Washington campus.

## Outreach

Interview for *Radio Physics* for KDNK radio and the Aspen Center for Physics 2021
- Spoke with a local high school student about my research and career path

Public Lecturer at Amateur Astronomers, Inc. 2021
- "How Starbursts Shape Dwarf Galaxies"

Public Speaker at Astronomy on Tap Seattle 2017 – 2019
- Gave two public talks on my galaxy evolution research

Presenter at the University of Washington Planetarium 2014 – 2017
- Developed and presented shows for groups between ages ∼5 and 13

Activity Leader for the University of Washington Mobile Planetarium 2014 – 2017
- Developed and led planetarium shows and hands-on educational activities
- Gave a public lecture on the Sloan Digital Sky Survey

## Awards & Fellowships

NSF Graduate Research Fellowship 2015
*"Constraining the Gas Flow Histories of Galaxies using Chemical Evolution"*

NSF Integrative Graduate Education and Research Traineeship for Data Science 2014
*"Systematic Effects in High-Dimensional Galaxy Datasets"*

Achievement Rewards for College Scientists Fellowship 2013

NASA Pennsylvania Space Grant Consortium Research Scholarship 2012
*"Morphological Galaxy Classification and Flux Calibration of a New Spectrograph"*

Swanson School of Engineering Research Fellowship 2011
*"Development of Learner-Adaptive Capabilities for a Dialysis Training Simulator"*

Swanson School of Engineering Honors Scholarship 2008

University of Pittsburgh Full Tuition Honors Scholarship 2008