R. O. Parke Loyd

Research Scientist Eureka Scientific, Inc. astroparke@gmail.com Last update 2024 April 22

I seek answers to how stellar space environments affect planetary evolution, using ultraviolet observations to probe stellar space weather, planetary magnetic fields, and planetary atmospheric escape, with occasional forays into theory and modeling.

Education

PhD Astrophysics and Planetary Science, University of Colorado, Boulder
Thesis: The Volatility of Far-Ultraviolet Radiation from Low-Mass Stars and Planetary Implications
Advisor: Kevin France

BS Aerospace Engineering, Virginia Tech
summa cum laude, honors baccalaureate
minors in astronomy, mathematics, and physics

August 2017

December 2009

Employment History

2021 June - Present: Research Scientist, Eureka Scientific, Inc.
 2021 June - 2021 December: Assistant Research Scientist, Arizona State University
 2017 Oct - 2021 May: Postdoctoral Research Scholar, Arizona State University

Publications

Please note that databases like ADS sometimes ingest my last name as "Parke Loyd" rather than the correct "Loyd." ORCID (0000-0001-5646-6668) | ADS | Google

Stats

from NASA ADS, refereed papers only published first author papers 9, all papers 45, first author citations 488, all citations 1975, h-index 21

First Author

Loyd, R. O. Parke et al. "Hydrogen Escaping from a Pair of Exoplanets Smaller than Neptune" Nature in revision	2024
Loyd, R. O. Parke et al. "Flares, Rotation, Activity Cycles and a Magnetic Star-Planet Interaction Hypothesis for the Far Ultraviolet Emission of GJ 436" 2023 AJ 165:146	2023
Loyd, R. O. Parke et al. "Constraining the Physical Properties of Stellar Coronal Mass Ejections with Coronal Dimming: Application to Far Ultraviolet Data of ε Eri" 2022 ApJ 936:170	2022
Loyd, R. O. Parke et al. "HAZMAT. VII. The Evolution of Ultraviolet Emission with Age and Rotation for Early M Dwarf Stars" 2021 ApJ 907:91	2021
Loyd, R. O. Parke et al. "When "Boring" Stars Flare: The Ultraviolet Activity of GJ 887, a Bright M Star Hosting Newly Discovered Planets" 2020 RNAAS 4:119	2020

	R. O. Parke et al. "Current Population Statistics Do Not Favor Photoevaporation over Core-Powered Mass s the Dominant Cause of the Exoplanet Radius Gap" 2020 ApJ 890:23	2020
Loyd, 1 867:70	R. O. Parke et al. "HAZMAT. IV. Flares and Superflares on Young M Stars in the Far Ultraviolet" 2018 ApJ	2018
Loyd, I ApJ 86	R. O. Parke et al. "The Muscles Treasury Survey. V. FUV Flares on Active and Inactive M Dwarfs" 2018 57:71	2018
	R. O. Parke et al. "Ultraviolet C II And Si III Transit Spectroscopy And Modeling Of The Evaporating osphere Of GJ436b" 2017 ApJL 834:17	2017
	R. O. Parke et al. "The MUSCLES Treasury Survey. III. X-Ray to Infrared Spectra of 11 M and K Stars ing Planets" 2016 ApJ 824:102	2016
	R. O. Parke; France, Kevin "Fluctuations and Flares in the Ultraviolet Line Emission of Cool Stars: ications for Exoplanet Transit Observations" 2014 ApJS 211:9	2014
Coaut	hor	
3	Schreyer, Ethan et al. "Using Lyman- α transits to constrain models of atmospheric escape" MNRAS 533:3296	2024
3	Jackman, James et al. "A dragon's flame of many colours: multiwavelength observations of flares from the active M binary CR Draconis" MNRAS 529:4354	2024
3	Sandoval, Angeli et al. "New and Improved Ly α Reconstructions for M and K Dwarfs" ApJ 957:90	2023
n th	Louca, Amy et al. "The impact of time-dependent stellar activity on exoplanet atmospheres" MNRAS 521:3333	2023
n^{th}	Brown, Alexander et al. "Coronal X-Ray Emission from Nearby, Low-mass, Exoplanet Host Stars Observed by the MUSCLES and Mega-MUSCLES HST Treasury Survey Projects" AJ 165:195	2023
n^{th}	Jackman, James et al. "Extending optical flare models to the UV: results from comparing of TESS and GALEX flare observations for M Dwarfs" MNRAS 519:3564	2023
n	Owen, James et al. "The fundamentals of Lyman-alpha exoplanet transits", MNRAS 518:4357	2023
4	Ramiaramanantsoa, Tahina et al. "Onboard dynamic image exposure control for the Star-Planet Activity Research CubeSat (SPARCS)" MNRAS 509:5702	2022
4	Ramiaramanantsoa, Tahina et al. "Time-resolved photometry of the high-energy radiation of M dwarfs with the Star-Planet Activity Research Cubesat" Astronomische Nachrichten 343:10068 2022AN34310068R	2022
n	Chavali, Shashank et al. "A Pilot Survey of an M Dwarf Flare Star with Swift's UV Grism" RNAAS 6:201	2022
n	Howard, Ward et al. "The Mouse That Squeaked: A Small Flare from Proxima Cen Observed in the Millimeter, Optical, and Soft X-Ray with Chandra and ALMA" ApJ 938:103	2022
3	Richey-Yowell et al. "HAZMAT. VIII. A Spectroscopic Analysis of the Ultraviolet Evolution of K Stars: Additional Evidence for K Dwarf Rotational Stalling in the First Gigayear" ApJ 929:169	2022
6	Ardila, David et al. "The UV-SCOPE mission: ultraviolet spectroscopic characterization of planets and their environments" SPIE 12181:04	2022
n	Peacock, Sarah et al. "Accurate Modeling of Ly α Profiles and Their Impact on Photolysis of Terrestrial Planet Atmospheres" ApJ 911:25	2022
3	MacGregor, Meredith et al. "Discovery of an Extremely Short Duration Flare from Proxima Centauri Using Millimeter through Far-ultraviolet Observations" ApJ 911:25	2021
n	Duvvuri, Girish et al. "Reconstructing the Extreme Ultraviolet Emission of Cool Dwarfs Using Differential Emission Measure Polynomials" ApJ 913:40	2021

3	Jackman, James et al. "Stellar flares from blended and neighbouring stars in Kepler short cadence observations" 2021 MNRAS 503:2033	2021
n	Wilson, David et al. "The Mega-MUSCLES Spectral Energy Distribution of TRAPPIST-1" 2021 ApJ 911:18	2021
n	Melbourne, Katie et al. "Estimating the Ultraviolet Emission of M Dwarfs with Exoplanets from Ca II and H α " AJ 160:269	2020
5	Lalitha, Sairam et al. "Proxima Centauri - the nearest planet host observed simultaneously with AstroSat, Chandra and HST" 2020 MNRAS 498:3658	2020
n	France, Kevin et al. "The High-Energy Radiation Environment Around a 10 Gyr M Dwarf: Habitable at Last?" 2020 AJ 160:237, high-Nth author	2020
4	Peacock, Sarah et al. "HAZMAT VI: The Evolution of Extreme Ultraviolet Radiation Emitted from Early M Stars" 2020 ApJ 895:5	2020
4	Gómez de Castro, Ana et al. "Accretion and Intercycle Variations in the PMS Interacting Binary AK Sco" ApJ 904:120	
4	Schneider, Adam et al. "Lyman- α Observations of High Radial Velocity Low-Mass Stars Ross 1044 and Ross 825" 2019 ApJ 886:19	2019
4	Froning, Cynthia et al. "A Hot Ultraviolet Flare on the M Dwarf Star GJ 674" 2019 ApJL 871:26	2019
5	France, Kevin et al. "Far-Ultraviolet Activity Levels of F, G, K, and M dwarf Exoplanet Host Stars" 2018 ApJS 239:16	2018
5	Howard, Ward et al. "The First Naked-eye Superflare Detected from Proxima Centauri" 2018 ApJL 860:30	2018
4	Hoadley, Keri et al. "Signatures of Hot Molecular Hydrogen Absorption from Protoplanetary Disks. I. Non-thermal Populations" 2017 ApJ 846:6	2017
4	Kruczek, Nicholas et al. "H ₂ Fluorescence in M Dwarf Systems: A Stellar Origin" 2017 ApJ 845:3	2017
3	Youngblood, Allison et al. "The MUSCLES Treasury Survey. IV. Scaling Relations for Ultraviolet, Ca II K, and Energetic Particle Fluxes from M Dwarfs" 2017 ApJ 843:31	2017
4	Airapetian, Vladimir et al. "How Hospitable Are Space Weather Affected Habitable Zones? The Role of Ion Escape" 2017 ApJ 836:L3	2016
5	Million, Chase et al. "gPhoton: The GALEX Photon Data Archive" 2016 ApJ 833:292, 5th author	2016
3	Youngblood, Allison et al. "The MUSCLES Treasury Survey. II. Intrinsic Lyα and Extreme Ultraviolet Spectra of K and M Dwarfs with Exoplanets" 2016 ApJ 824:101	2016
2	France, Kevin et al. "The MUSCLES Treasury Survey. I. Motivation and Overview" 2016 ApJ 820:89	2016
2	Gomez de Castro, Ana I et al. "Protoplanetary Disk Shadowing by Gas Infalling onto the Young Star AK Sco" 2016 ApJ 818L:17	2016
3	France, Kevin; Linsky, Jeffrey L.; Loyd, R. O. Parke "The ultraviolet radiation environment in the habitable zones around low-mass exoplanet host stars" 2014 Ap&SS 354:3	2014
4	Kulow, Jennifer R.; France, Kevin; Linsky, Jeffrey L.; Loyd, R. O. Parke "Lyα Transit Spectroscopy and the Neutral Hydrogen Tail of the Hot Neptune GJ 436b" 2014 ApJ 786:132	2014

Awarded Grants and Observations

Principal Investigator

HST General Observer, "Observing the Overlooked Double Lyman-alpha Transit of HD 189733 b to Break Mass Loss Rate Degeneracies" Program 17157	2022
HST General Observer, "Leveraging High Radial Velocities to Get to the Core of Planetary Lyman-alpha Transits" Program 16731	2021
HST General Observer, "Observing the Lyman-alpha Transits of Two Sub-Neptunes Orbiting a 400 Myr G Star to Illuminate the Cause of the Exoplanet Radius Valley" Program 16455 (ultimately not executed due to undocumented duplication)	2020
HST General Observer, "REVELATION: Reconnaissance of Extreme Velocity Exoplanets for Lyman-Alpha Transit Investigations of Outflowing Neutrals" Program 16456	2020
HST Archival Research, "Constraining CME Masses on the Active K Star and Planet Host Epsilon Eridani" Program 15803	2019
HST General Observer, "Investigating an SPI and Measuring Baseline FUV Variability in the GJ 436 Hot-Neptune System" Program 15174	2017
Co-Investigator	
HST General Observer, "Space weather on GJ 436 b" Program 17468, PI P. C. Schneider	2023
HST General Observer, "Constraining the mass loss in evaporating planets by catching the second tail" Program 17094, PI J. Spake	2022
HST General Observer, "Exposing the Lyman-alpha Profiles of Low-Mass Stars" Program 16646, PI S. Peacock	2021
HST Archival Research, "M-dwarf Exoplanet Direct Detection using Light Echoes (MEDDLE)" Program 16153, PI W. Sparks	2020
HST General Observer, "The K Dwarf Advantage: Assessing the Habitability of Planets Orbiting K Stars" Program 15955, PI T. Richey-Yowell	2019
HST General Observer, "The Origin and Impact of Flares in the Closest Planetary System - Proxima Centauri" Program 15651, PI M. MacGregor	2018
HST General Observer, "Benchmark Multi-Wavelength Flare Spectra of M Dwarfs" Program 15463, PI A. Youngblood	2017
HST General Observer, "Unobstructed Observations of the Intrinsic Lyman-alpha Emission of Low-mass Stars" Program 15286, PI A. Schneider	2017
HST General Observer, "The Mega-MUSCLES Treasury Survey: Measurements of the Ultraviolet Spectral Characteristics of Low-mass Exoplanetary Systems" Program 15071, PI C. Froning	2017
HST Archival Research, "Model Atmospheres and Spectral Irradiance Library of the Exoplanet Host Stars Observed in the MUSCLES Survey" Program 15038, PI J. Linsky	2017
HST Director's Discretionary, "The most detailed high-energy picture of Proxima Centauri, our nearest extrasolar neighbor" Program 14860, PI C. Schneider	2016

HST Snapshot Program, "A SNAP UV Spectroscopic Study of Star-Planet Interactions" Program 14633, PI K. France	2016
HST General Observer, "A Direct Imaging Experiment to Determine the Origin of H2 Emission from M dwarf Exoplanetary Systems" Program 14100, PI K. France	2016
HST General Observer, "The MUSCLES Treasury Survey: Measurements of the Ultraviolet Spectral Characteristics of Low-mass Exoplanetary Systems" Program 13650, PI K. France	2015
Conference Presentations	
Invited Talks, Colloquia, Seminars	
Lyman-α transits favor hydrogen-rich atmospheres αnd rocky cores for TOI-776 b & c UCLA Earth, Planetary, and Space Sciences Department Exoplanets Group Seminar	2024
Probing Two Threads of the Star-Planet Connection: Magnetic Interactions and Coronal Mass Ejections UC Berkeley Center for Integrative Planetary Science Seminar	2023
Direct Observational Constraints on Stellar Coronal Mass Ejections with Coronal Dimming Observations Lockheed Martin Solar and Astrophysics Lab Seminar	2022
The Far-Ultraviolet Window into Stellar Activity and Space Weather Stars and Planets in the Ultraviolet Conference	2021
Adrift in a Tempest: Observing Space Weather Conditions for Earth-Like Planets around Red Dwarf Stars ASU School of Earth and Space Exploration Department Colloquium	2021
Contributed Talks	
Insights into Stellar Storms from Far Ultraviolet Observations American Geophysical Union 23, San Francisco, CA	2023
Applying Lessons from Our Backyard to Probe the Space Weather Environment of Exoplanets Exoplanets in our Backyard 2, Albuquerque, NM	2022
Understanding Stellar Impacts on the Photochemistry of Rocky Planet Atmospheres with UV-SCOPE AAS 237, Terrestrial Exoplanets Session, Virtual Conference	2020
HAZMAT. IV. Flares and Superflares on Young M Stars in the Far Ultraviolet AAS 233, M Dwarfs Magnetic Activities and Flares Session, Seattle, Washington	2019
FUV Flares on M Stars, Active and Inactive, Old and Young ExoPAG 18 Meeting, Boston, Massachusetts	2018
The FUV Flares of Active and Inactive M Dwarfs Know Thy Star Know Thy Planet, Pasadena, California	2017
Cool Stars Provide Erratic Environments for Photochemistry AbGradCon, Boulder, Colorado	2016
FUV Emission Line Flares on M and K Dwarfs in the MUSCLES Survey Cool Stars 19, Uppsala, Sweden	2016
Posters	
Lyman-α transits favor hydrogen-rich atmospheres and rocky cores for TOI-776 b and c Extreme Solar Systems V, Christchurch, New Zealand	2023

The Majority of Stellar Environments are Harsher than the Sun's	2023
Life in the Universe, Sofia, Bulgaria	
How Can We Constrain Stellar Coronal Mass Ejections? A Proof of Concept for Coronal Dimming Using	2022
Archival Far Ultraviolet Spectrophotometry of ε Eridani	
Exoplanets IV, Las Vegas, Nevada	
The Need for a Comprehensive Time-domain UV Spectral Survey of Stars and UV-SCOPE's Mission to	2022
Obtain It	
Exoplanets IV, Las Vegas, Nevada	
Planets are Shaped by their Past: Reconstructing the Early XUV Emission of Exoplanet Host Stars	2019
Extreme Solar Systems IV, Reykjavík, Iceland	
HAZMAT. IV. Flares and Superflares on Young M Stars in the Far Ultraviolet	2018
Cool Stars 20, Boston, Massachusetts	
An Ultraviolet Spectral Examination of "Quiescent" M dwarf Exoplanet Host Flares	2015
IAUS 320, Honolulu, Hawaii	
The Radiation Environment of Habitable Zone Planets Orbiting Low Mass Stars	2015
Emerging Researchers in Exoplanet Science, State College, Pennsylvania	
Astrophysical Noise and a Search for Star-Planet Interactions in Ultraviolet Time-Series	2014
Towards Other Earths, Porto, Portugal	
Fluctuations and Flares in Stellar UV Emission Observed by HST and GALEX	2014
Cool Stars 18, Flagstaff, Arizona	2017
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Code

Please see my GitHub profile (github.com/parkus) for my publicly-shared codes, including

- spectralPhoton: handling spectrograph photon lists (namely from *HST* COS and STIS)
- emd: empirical mode decomposition
- flaiil: Flare identification in intermittent lightcurves
- ffd: flare frequency distribution fitting
- fiducial_flare: generator of template stellar flares for use in exoplanet modeling

Teaching & Public Outreach Experience

Co-creator and Instructor of Wilderness Astronomy, SES 494, intensive outdoor learning	spring 2019
experience	spring 2020
Instructor of Record, ASTR 2600, Computational Techniques	summer 2015
student ratings: instructor overall 5.5/6, course overall 4.9/6	
Mentor, Boulder Valley School District: Science Research Seminar student	academic year 2013
Teaching Assistant, ASTR 1200, Stars and Galaxies	fall 2011
	fall 2012
Teaching Assistant, ASTR 1000, The Solar System	spring 2012

Service

Keck Institute for Space Studies instigator and co-organizer of the Blazing Paths to Observing Stellar	2023 - 2024
and Planetary Particle Environments workshop	
Observation/Grant Allocation Committee for US telescope and grant allocation committees	2018 - present
(1-2x yearly)	

Science and Logistical Organizing Committees for "Stars and Planets in the Ultraviolet: a Cross	2021
Community Symposium"	
Outreach with local Boy Scout troop	2020
Member of sponsor group for Burmese refugee family relocated to Boulder	2012 - 2016
Committee member: colloquium speaker graduate student lunch series	2014/2015
Committee member: graduate comprehensive exam	2013/2014
Committee member: graduate concerns	2012/2013