

# ALEXANDER H. RILEY

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## RESEARCH INTERESTS

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Local Group dynamics – cosmological simulations – stellar streams – near-field cosmology – dark matter – low-mass galaxies

## POSITIONS

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**Durham University**  
1851 Research Fellow 2022 - current

## EDUCATION

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**Texas A&M University**  
Ph.D. in Astronomy, Advisor: Dr. Louis Strigari 2022  
M.S. in Astronomy 2020

**University of Texas at Dallas**  
B.S. in Physics, *summa cum laude*, Collegium V Honors, Major Honors 2017

## FUNDING AND AWARDS

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### *Funding for my position*

Research Fellowship from the Royal Commission for the Exhibition of 1851 2022 - 2025  
NSF Graduate Research Fellowship 2019 - 2022  
Texas A&M University Merit Fellowship 2017 - 2019  
UT Dallas Academic Excellence Scholarship 2013 - 2017

### *Prizes and awards*

LSST:UK Pool Travel Grant (GBP 800) 2024  
Cosmology and Astroparticle Student & Postdoc Exchange Network Grant (GBP 3400) 2024  
Durham University Physics Department Developing Talent Award (GBP 5000) 2023  
Texas A&M College of Science Catalyze Grant (USD 4000) 2022  
NASA/Texas Space Grant Consortium (TSGC) Fellowship (USD 5000) 2018 - 2019  
TSGC STEM Columbia Crew Memorial Scholarship (USD 2000) 2015 - 2017  
UT Dallas Undergraduate Research Grant (USD 500) 2014  
Silver medal, University Physics Competition 2014

## PUBLICATION SUMMARY

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refereed: 32 – primary author: 8 – citations: 1044 – *h*-index: 15 (2024 October 18)  
[ORCID](#) – [ADS Search](#) – citations compiled by SAO/NASA Astrophysics Data System

## PRESENTATION SUMMARY

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Conference talks: 29 – Seminars: 11 – Conference posters: 7 – Outreach talks: 7

Prominent recent talks include:

5. *The tangled web of disrupting satellites around Milky Way-mass galaxies*, Resolved stellar populations: from photographic plates to large surveys, Florence, Italy, October 2024

4. *The tangled web of disrupting satellites around Milky Way-mass galaxies*, Richard Bower Memorial Workshop, Durham University, September 2024
3. *Velocity dipoles in the haloes of FIRE simulated galaxies*, XMC Milky Clouds Over Manhattan, Flatiron CCA, February 2024
2. *Level Up! Stellar streams in cosmological simulations of Milky Way analogues*, The Milky Way Is Not an Island, Sexten, Italy, January 2024
1. *Mock surveys from cosmological simulations of Milky Way analogues*, Revealed by Gaia: The Central Halo of the Milky Way, University of Cambridge, September 2023

## SCIENTIFIC COLLABORATIONS

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ARRAKIHS Mission Consortium: Member	2024 - <i>current</i>
Dark Energy Spectroscopic Instrument (DESI): Member	2023 - <i>current</i>
LSST Dark Energy Science Collaboration (DESC): Member	2021 - <i>current</i>
DECam Local Volume Exploration Survey (DELVE): Member	2019 - <i>current</i>
Dark Energy Survey (DES): Member	2017 - 2022

## TELESCOPE AND COMPUTING TIME

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Co-I on 11 successful proposals across DECam, Hubble, Keck and VLT. Highlighted proposals include the following:

Co-I, 274M cpu-hours, STFC DiRAC 16th RAC call, PI: Frenk <i>Virgo I: The formation, evolution and clustering of galaxies</i> (co-lead on project “The Milky Way: assembly, structure, dynamics”)	2024 - 2027
Co-I, 55.5 nights on Blanco/DECam, PI: Chiti <i>The DECam MAGIC Survey: Mapping the Ancient Galaxy in CaHK</i>	2023 - 2026
Co-I, 126 nights on Blanco/DECam, PI: Drlica-Wagner <i>DECam Local Volume Exploration Survey</i>	2019 - 2023

## RESEARCH STUDENT SUPERVISION

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Josh Ward (Durham University) co-supervision of MSc thesis <i>Finding dark matter with deep learning</i>	2024 - <i>current</i>
Fergus Henstridge (Durham University) co-supervision of MSc thesis, 1 publication in prep. <i>Constraining the nature of dark matter with Galactic stellar halos</i>	2023 - 2024
Namitha Kizhuprakkat (National Tsing Hua University) co-supervision of PhD project, contributed to 1 publication	2023 - 2024
Yuewen Qi (Texas A&M University) co-supervision of PhD project, contributed to 1 publication	2023 - 2024

## PROFESSIONAL LEADERSHIP AND SERVICE

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Referee for ApJ, A&A	(omitted to preserve anonymity)
Co-lead for DESI Year 3 Key Project to measure Milky Way mass profile	2024 - <i>current</i>
Durham Physics Research Staff Consultative Committee member	2023 - <i>current</i>
Durham Astronomy ICC postdoctoral representative to astronomy group	2023 - <i>current</i>
Organiser, Durham astronomy daily arXiv journal club	2022 - <i>current</i>
Early Career Representative in the DELVE collaboration	2020 - 2023
Senator in the Texas A&M Graduate and Professional Student Government	2020 - 2022
<i>Conference organisation</i>	
Organiser, “Streams24: The Theory Edition”	Aug 2024

LOC member, “Small Galaxies Cosmic Questions II”	Aug 2024
LOC member, 20th Durham-Edinburgh eXtragalactic (DEX) workshop	Jan 2024
LOC member, DESI Milky Way Survey workshop	Aug 2023

## OUTREACH

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Skype a Scientist, 2 classrooms per semester	2018 - <i>current</i>
Letters to a Pre-Scientist, pen pal for 1 school year	2018 - <i>current</i>
Great Exhibition Road Festival, interactive stellar streams exhibit	June 2024
Street Cosmos at Blackhall demonstrator	Aug 2023
Holst’s <i>The Planets</i> with Durham University Orchestral Society, speaker	Mar 2023
“In the News” monthly presentations at Astronomy on Tap BCS	2018 - 2022
Astronomy on Tap BCS, local branch founder and organiser	2018 - 2021

## TEACHING

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Demonstrator, Stars and Galaxies, Durham University	2022 - 2023
Teaching Assistant, Weather and Climate, UT Dallas	Spring 2017
Instructor, Physics II (E&M) Lab, UT Dallas	Fall 2016
Teaching Assistant, Physics I (Mechanics), UT Dallas	Spring 2016
Private Tutor, high school physics and math, Tutor Doctor	2014 - 2016

## PROFESSIONAL AND HONOR SOCIETIES

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American Astronomical Society, Society for Advancement of Chicanos/Hispanics and Native Americans in Science, Phi Kappa Phi, Sigma Pi Sigma, Sigma Xi

# PUBLICATION LIST

## PRIMARY AUTHOR

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Papers where I was a primary contributor to the analysis and/or writing.

8. N. Shipp, **A.H. Riley**, C.M. Simpson, R. Bieri, L. Necib, A. Arora, F. Fragkoudi, F.A. Gómez, R.J.J. Grand, F. Marinacci. *Auriga Streams II: orbital properties of tidally disrupting satellites of Milky Way-mass galaxies*. submitted to MNRAS. ([ADS](#), [arXiv](#))
7. **A.H. Riley**, N. Shipp, C.M. Simpson, R. Bieri, A. Fattahi, S.T. Brown, K.A. Oman, F. Fragkoudi, F.A. Gómez, R.J.J. Grand, F. Marinacci. *Auriga Streams I: disrupting satellites surrounding Milky Way-mass haloes at multiple resolutions*. submitted to MNRAS. ([ADS](#), [arXiv](#))
6. K.A. Oman & **A.H. Riley**. *An overlooked source of uncertainty in the mass of the Milky Way*. 2024, MNRAS 352, L48. ([ADS](#), [arXiv](#))
5. N. Kizhuprakkat, A.P. Cooper, **A.H. Riley** et al. (DESI Collaboration). *AuriDESI: mock catalogues for the DESI Milky Way Survey*. 2024, MNRAS 531, 4108. ([ADS](#), [arXiv](#))
4. T.T. Hansen, **A.H. Riley**, L.E. Strigari, J.L. Marshall, P.S. Ferguson, J. Zepeda, C. Sneden. *A chemodynamical link between the Gjöll stream and NGC 3201*. 2020, ApJ 901, 23. ([ADS](#), [arXiv](#))
3. **A.H. Riley** & L.E. Strigari. *The Milky Way's stellar streams and globular clusters do not align in a Vast Polar Structure*. 2020, MNRAS 494, 983. ([ADS](#), [arXiv](#))
2. **A.H. Riley**, A. Fattahi, A.B. Pace, L.E. Strigari, C.S. Frenk, F.A. Gómez, R.J.J. Grand, F. Marinacci, J.F. Navarro, R. Pakmor, C.M. Simpson, S.D.M. White. *The velocity anisotropy of the Milky Way satellite system*. 2019, MNRAS 486, 2679. ([ADS](#), [arXiv](#))
1. **A.H. Riley**, L.E. Strigari, T.A. Porter, R.D. Blandford, S. Murgia, M. Kerr, G. Jóhannesson. *Possible detection of gamma rays from Epsilon Eridani*. 2019, ApJ 878, 8. ([ADS](#), [arXiv](#))

## CO-AUTHOR

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29. A. Byström et al. (DESI Collaboration). *Exploring the interaction between the MW and LMC with a large sample of blue horizontal branch stars from the DESI survey*. submitted to MNRAS. ([ADS](#), [arXiv](#))
28. C.Y. Tan et al. (DELVE Collaboration). *A Pride of Satellites in the Constellation Leo? Discovery of the Leo VI Milky Way Satellite Galaxy with DELVE Early Data Release 3*. submitted to ApJ. ([ADS](#), [arXiv](#))
27. M. Valluri et al. (DESI Collaboration). *GD-1 Stellar Stream and Cocoon in the DESI Early Data Release*. submitted to ApJ. ([ADS](#), [arXiv](#))
26. W. Cerny et al. (DELVE Collaboration). *A Discovery and Spectroscopic Confirmation of Aquarius III: A Low-Mass Milky Way Satellite Galaxy*. in press (accepted) in ApJ. ([ADS](#), [arXiv](#))
25. G. Teixeira et al. (DELVE Collaboration). *Photometric Redshifts Probability Density Estimation from Recurrent Neural Networks in the DECam Local Volume Exploration Survey Data Release 2*. in press (accepted) in Astronomy & Computing. ([ADS](#), [arXiv](#))
24. E. Vienneau, A.J. Evans, O.V. Hartl, N. Bozorgnia, L.E. Strigari, **A.H. Riley**, N. Shipp. *Significant impact of Galactic dark matter particles on annihilation signals from Sagittarius analogues*. 2024, JCAP 10, 19. ([ADS](#), [arXiv](#))
23. S.E. Kuposov et al. (DESI Collaboration). *DESI Early Data Release Milky Way Survey value-added catalogue*. 2024, MNRAS 533, 1012. ([ADS](#), [arXiv](#))

22. S.T. Brown, A. Fattahi, I.G. McCarthy, A.S. Font, K.A. Oman, **A.H. Riley**. *ARTEMIS emulator: exploring the effect of cosmology and galaxy formation physics on Milky Way-mass haloes and their satellites*. 2024, MNRAS 532, 1223. ([ADS](#), [arXiv](#))
21. V. Alfradique et al. (DELVE Collaboration). *A dark siren measurement of the Hubble constant using gravitational wave events from the first three LIGO/Virgo observing runs and DELVE*. 2024, MNRAS 528, 3249. ([ADS](#), [arXiv](#))
20. M. McNanna et al. (DELVE Collaboration). *A Search for Faint Resolved Galaxies Beyond the Milky Way in DES Year 6: A New Faint, Diffuse Dwarf Satellite of NGC 55*. 2024, ApJ 961, 126. ([ADS](#), [arXiv](#))
19. E. Zaborowski et al. (DELVE Collaboration). *Identification of Galaxy-Galaxy Strong Lens Candidates in the DECam Local Volume Exploration Survey Using Machine Learning*. 2023, ApJ 954, 68. ([ADS](#), [arXiv](#))
18. W. Cerny et al. (DELVE Collaboration). *Six More Ultra-Faint Milky Way Companions Discovered in the DECam Local Volume Exploration Survey*. 2023, ApJ 953, 1. ([ADS](#), [arXiv](#))
17. W. Cerny et al. (DELVE Collaboration). *Pegasus IV: Discovery and Spectroscopic Confirmation of an Ultra-Faint Dwarf Galaxy in the Constellation Pegasus*. 2023, ApJ 942, 111. ([ADS](#), [arXiv](#))
16. A. Drlica-Wagner et al. (DELVE Collaboration). *The DECam Local Volume Exploration Survey Data Release 2*. 2022, ApJS 261, 38. ([ADS](#), [arXiv](#))
15. Y. Qi, P. Zivick, A.B. Pace, **A.H. Riley**, L.E. Strigari. *Stellar proper motions in the outskirts of classical dwarf spheroidal galaxies with Gaia EDR3*. 2022, MNRAS 512, 5601. ([ADS](#), [arXiv](#))
14. S. Mau et al. (DES Collaboration). *Milky Way Satellite Census. IV. Constraints on Decaying Dark Matter from Observations of Milky Way Satellite Galaxies*. 2022, ApJ 932, 128. ([ADS](#), [arXiv](#))
13. K. Tavangar et al. (DES Collaboration). *From the Fire: A Deeper Look at the Phoenix Stream*. 2022, ApJ 925, 118. ([ADS](#), [arXiv](#))
12. P.S. Ferguson et al. (DELVE Collaboration). *DELVE-ing into the Jet: A Thin Stellar Stream on a Retrograde Orbit at 30 kpc*. 2021, AJ 163, 18. ([ADS](#), [arXiv](#))
11. C.E. Martínez-Vázquez et al. (DELVE Collaboration). *RR Lyrae Stars in the Newly Discovered Ultra-faint Dwarf Galaxy Centaurus I*. 2021, AJ, 162, 253. ([ADS](#), [arXiv](#))
10. W. Cerny et al. (DELVE Collaboration). *Eridanus IV: an Ultra-Faint Dwarf Galaxy Candidate Discovered in the DECam Local Volume Exploration Survey*. 2021, ApJL 920, L44. ([ADS](#), [arXiv](#))
9. A. Drlica-Wagner et al. (DELVE Collaboration). *The DECam Local Volume Exploration Survey: Overview and First Data Release*. 2021, ApJS 256, 2. ([ADS](#), [arXiv](#))
8. E.O. Nadler et al. (DES Collaboration). *Constraints on Dark Matter Properties from Observations of Milky Way Satellite Galaxies*. 2021, PRL 126, 091101. ([ADS](#), [arXiv](#))
7. W. Cerny et al. (DELVE Collaboration). *Discovery of an Ultra-faint Stellar System near the Magellanic Clouds with the DECam Local Volume Exploration Survey*. 2021, ApJ 910, 18. ([ADS](#), [arXiv](#))
6. E.O. Nadler et al. (DES Collaboration). *Milky Way Satellite Census. II. Galaxy-Halo Connection Constraints Including the Impact of the Large Magellanic Cloud*. 2019, ApJ 893, 48. ([ADS](#), [arXiv](#))
5. S. Mau et al. (DELVE Collaboration). *Two Ultra-Faint Milky Way Stellar Systems Discovered in Early Data from the DECam Local Volume Exploration Survey*. 2019, ApJ 890, 136. ([ADS](#), [arXiv](#))
4. C.E. Martínez-Vázquez et al. (DES Collaboration). *Search for RR Lyrae stars in DES ultrafaint systems: Grus I, Kim 2, Phoenix II, and Grus II*. 2019, MNRAS 490, 2183. ([ADS](#), [arXiv](#))

3. K.M. Stringer et al. (DES Collaboration). *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. ([ADS](#), [arXiv](#))
2. D.H. Eilbott, **A.H. Riley**, J.H. Cohn, M. Kesden, L.J. King. *Detecting binarity of GW150914-like lenses in gravitational microlensing events*. 2017, MNRAS 467, L100. ([ADS](#), [arXiv](#))
1. X. Liu, D. Wu, G.K. Zewdie, L. Wijerante, C.I. Timms, **A.H. Riley**, E. Levetin, D.J. Lary. *Using machine learning to estimate atmospheric Ambrosia pollen concentrations in Tulsa, OK*. 2017, EnvHI 467, 117863021769939. ([ADS](#))

## WHITE PAPERS

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3. A. Dey et al. *RomAndromeda: The Roman Survey of the Andromeda Halo*. 2023. ([ADS](#), [arXiv](#))
2. J. Han et al. *NANCY: Next-generation All-sky Near-infrared Community survey*. 2023. ([ADS](#), [arXiv](#))
1. K. Breivik et al. *From Data to Software to Science with the Rubin Observatory LSST*. 2022. ([ADS](#), [arXiv](#))