

# Kristen Dage

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## RESEARCH INTERESTS

optical surveys, globular clusters, X-ray binaries, machine learning, accretion physics & high energy phenomena

## APPOINTMENTS

- starting* 2023 **NASA Einstein Fellow**  
Wayne State University  
Detroit, Michigan, USA
- 2020 - 2023 **FRQNT/MSI Postdoctoral Fellow**  
McGill University  
Montréal, Québec, Canada
- 2020 **Postdoctoral Research Associate**  
Michigan State University  
East Lansing, Michigan, USA

## EDUCATION

- 2015 - 2020 **Michigan State University**, East Lansing, Michigan, USA  
Ph.D. Astronomy & Astrophysics
- 2015 - 2017 **Michigan State University**, East Lansing, Michigan, USA  
M.Sc. Astronomy & Astrophysics
- 2012 - 2014 **University of Michigan-Dearborn**, Dearborn, Michigan, USA  
B.Sc. Physics

## AWARDS, HONOURS AND GRANTS

- 2023 **Einstein Fellowship**, NASA Hubble Fellowship Program
- 2022 **Mentorship Award**, Association of Postdoctoral Fellows, McGill University
- 2022 **Bourses de recherche postdoctorale**, “Sources de rayons X ultralumineuses dans les amas d’étoiles extragalactiques: contraintes des binaires de rayons X ultra-compacts, des trous noirs et des amas d’étoiles qui les hébergent”, Fonds de recherche du Québec – Nature et technologies (FRQNT)
- 2022 **Durand Travel Fund**, Aspen Center for Physics
- 2020 **Sherwood K. Haynes Graduate Physics Award for Outstanding Graduate Student**, Dept. Physics & Astronomy - Michigan State
- 2020 **McGill Space Institute (MSI) Postdoctoral Fellowship Prize**, McGill University
- 2019 **Dissertation Completion Fellowship**, College of Natural Science - Michigan State
- 2019 **AAS International Travel Grant**, National Sciences Foundation
- 2014 **Outstanding Physics Student**, Dept. Natural Sciences, University of Michigan-Dearborn
- 2014 **Outstanding Math Tutor**, Academic Support Center, Oakland Community College

## ACCEPTED TELESCOPE PROPOSALS

- 2023 **Gemini South 2023B:** “High Resolution Spectroscopy of NGC 1399’s Extensive Globular Cluster System”, 26.8 hr, **PI: K. Dage**
- 2023 **Gemini South Fast Turnaround:** “Variability of RZ2109’s [OIII] emission line”, 5.5 hours, **PI: K. Dage**
- 2023 **Very Long Baseline Array** “Radio emission from an ultra-luminous X-ray source: compact or extended jets?”, 6 hours, PI: A. Bahramian
- 2022 **NICER Cycle 5:** Monitoring SMC X-1’s Warped Accretion Disc Out of Excursion, 30ks, **PI: K. Dage**
- 2022 **Gemini-North 2023A:** “Tick Tock: A Spectroscopic Investigation into an Imminently Merging Supermassive Black Hole Binary Candidate”, 7.8 hours, PI: N. Ford
- 2022 **Karl G. Jansky Very Large Array:** Massive black holes in young star clusters, 10 hours (A configuration) **PI: K. Dage**
- 2022 **Australian Telescope Compact Array:** Radio Constraints on Massive Black Hole Candidates in Nuclear Star Clusters, 72 hours **PI: K. Dage**
- 2022 **Chandra Cycle 24:** Characterizing the Nature of Globular Cluster ULX Sources in NGC 1399, 40ks+1 NOAO night, \$23,440 USD **PI: K. Dage**
- 2021 **Gemini South Fast Turnaround:** Confirming the Decline of [NII] Emission in Globular Cluster Ultraluminous X-ray Source GCU7, 5.5 hours **PI: K. Dage**
- 2021 **Chandra Cycle 23:** The Hunt for a new ultra-compact X-ray binary in M87’s globular cluster system, 40ks, \$21,520 USD **PI: K. Dage**
- 2021 **Chandra Cycle 23:** The Next Breakthroughs Community Program: Chandra-VLA Observations of Compact-Object Mergers, PIs: D. Haggard, J. Neilsen
- 2021 **NuSTAR Cycle 7:** Investigating pulsation transience in SMC X-1 during superorbital period excursion, PI: M. Brumback
- 2021 **JWST Cycle 1:** Do Massive Black Holes Come in Small Packages? A census of black holes in compact stellar systems in the Virgo cluster, 41.2 Primary Spacecraft Hours, PI: M. Taylor
- 2021 **NICER Cycle 3:** Monitoring SMC X-1’s reprocessed emission during an epoch of superorbital period excursion, 120ks, **PI: K. Dage**
- 2020 **Gemini South 2021A:** Searching for evidence of outflows in globular cluster X-ray binary M87-GCULX1, 7.2 hours, **PI: K. Dage**
- 2020 **Chandra Cycle 22:** The LMXB population of NGC 3998: Testing for an extreme IMF, PI: S. Zepf
- 2020 **HST Cycle 28:** Far-ultraviolet insights into multiple populations in extragalactic globular clusters, PI: S. Zepf
- 2020 **NuSTAR Cycle 6:** Complete spectral characterisation of a newly discovered ULX, 40ks and \$20,000 USD, **PI: K. Dage**
- 2019 **Niels Gehrels Swift Observatory** Target of Opportunity, 24ks, **PI: K. Dage**
- 2019 **Chandra Cycle 21:** A high spatial resolution X-ray survey of the halo of M87, PI: M. Peacock
- 2019 **Swift** Target of Opportunity, 10ks, **PI: K. Dage**
- 2018 **Chandra Cycle 20:** The nature of the two globular cluster ULXs in the galaxy NGC 4472, PI: S. Zepf

## TEACHING EXPERIENCE

- 2021 **Guest Lecturer**  
Graduate High Energy Astrophysics & Undergraduate Modern Physics and Relativity  
McGill University, Québec, Canada
- 2018 **Certificate in Inclusive Inquiry STEM Education**  
Institute for Scientist & Engineer Educators Professional Development  
University of Santa Cruz, California, USA

2018           **Astronomy Instructor**  
 Gifted and Talented Education program  
 Michigan State University, Michigan, USA

2015 - 2018   **Teaching Assistant**  
 Visions of the Universe Laboratory  
 Michigan State University, Michigan, USA

2011 - 2014   **German, Math, Physical Sciences Tutor**  
 Academic Support Center  
 Oakland Community College, Michigan, USA

2011           **Teaching Assistant**  
 Physical Science  
 Oakland Community College, Michigan, USA

## INTERNATIONAL COLLABORATIONS AND PROFESSIONAL SOCIETIES

2022 - present   Evolutionary Map of the Universe (EMU) Radio Survey

2022 - present   International Astronomical Union

2022 - present   ngEHT - Transient Science Working Group

2022 - present   AXIS Probe Mission Concept Science Working Group

2022 - present   Athena Science Study Team - Physics of Accretion Subgroup

2022 - present   CASTOR Time Domain Science Working Group

2022 - present   STROBE-X Science Working Group

2021 - present   The Legacy Survey of Space & Time - Stars, Milky Way and Local Volume - Transient and Variable Stars Working Groups

2021 - present   Astrostatistics Interest Group of the American Statistical Association

2021 - 2023      Canadian Astronomical Society/Société Canadienne d'Astronomie

2020 - present   LISA Consortium, ESA L3 Approved Mission

2020 - 2023      Centre de recherche en astrophysique du Québec

2016 - present   American Astronomical Society

## STUDENT RESEARCH SUPERVISION

2023 - present   Marie Fawaz, Henry Ford College, USA

2023 - present   Cortney Rinehart, Henry Ford College, USA

2023 - present   Anthony Preston, Henry Ford College, USA

2022 - 2023      Rawan Karam, B.Sc. (Honours), McGill University, Canada

2021 - 2022      Yifan Sun, B.Sc. (Honours), McGill University, Canada

2021 - 2022      Jeff Huang, B.Sc (Honours), McGill University, Canada

2020 - 2022      Sneha Nair, B.Sc. (Honours), McGill University, Canada

2020 - 2022      Emma Barbisan, B.Sc., McGill University, Canada

2020 - 2021      Jade Ducharme, B.Sc., McGill University, Canada

2020 - 2022      Wasundara Athukoralalage, B.Sc., Michigan State University, USA

2019 - 2021      Erica Thygesen (w/ Zepf), M.Sc., Michigan State University, USA

2019              Noah Vowell, B.Sc., University of Michigan-Dearborn, USA

2018              Omid Noroozi, B.Sc. (Honours), Michigan State University, USA

## ANALYSIS, SOFTWARE AND SKILLS

- X-ray spectroscopy, imaging and timing analysis (*Chandra*, *MAXI*, *NICER*, *NuSTAR*, *RXTE*, *Swift*, *XMM*)
- Optical spectroscopy (*SOAR/GHTS*, *Gemini/GMOS*, *VLT/FORS2*)
- Ultraviolet imaging and photometry (*Swift/UVOT*, *GALEX*, *HST/ACS*)
- Infrared imaging (*Spitzer/IRAC*)
- Radio continuum imaging (*Australian Telescope Compact Array*)
- Gamma-ray binned likelihood analysis (*Fermi/LAT*)
- Conducting optical observations: *SOAR* observatory (300+ hours), ATCA (50+ hours)
- Programming: Python (astropy, numpy, scipy, scikit-learn, matplotlib, Keras), Mathematica
- Major astronomical packages: AstroPy, CIAO, HEASoft (XSpec, FTools), IRAF, CASA, Fermitools

## ACADEMIC SERVICE

2022	Rubin Observatory Data Preview 2 Delegate
2022-2024	NICER User's Group
2022-	co-Chair, Star Clusters Science Subgroup for Rubin Observatory
2022	Canadian Space Agency High Energy Astrophysics Topical Team
2022	Executive Secretary in NASA Astrophysics Senior Review
2021-	Publication referee: Monthly Notices of the Royal Astronomical Society, The Astrophysical Journal, Chinese Journal of Physics
2021-	Time/Funding Allocation Committees: NASA ADAP, NSF AAG, Chandra, NICER (deputy chair), NuSTAR (deputy chair), Swift, XRISM GS
2021-	External Reviewer: Canadian Time Allocation Committee (CanTAC), Indian Space Research Organisation (ISRO), Hubble Space Telescope, James Webb Space Telescope
2021	McGill Space Institute Undergrad Awards Committee
2020-2022	Postdoc Liaison, McGill Physics Equity, Diversity, and Inclusion
2016-2020	MSU Astronomy Journal Discussion Organizer

## MENTORING

2022-2023	Laser Interferometer Space Antenna – Early Career Scientist Mentor
2021-2022	Physics & MSI Summer Student Program, McGill University, Québec, Canada
2021-2022	Physics and Astronomy Research Experiences for Drew Scholars, Michigan State University, Michigan, USA
2021-2022	Mentoring for Women in Physics, Supernova Foundation
2020	Undergraduate Professional Development Seminars, Michigan State University and University of Michigan-Dearborn, Michigan, USA
2019-2020	Co-founder, Stellar Mentoring Program, Michigan State University, Michigan, USA

## SELECTED SEMINAR TALKS

– 18 invited seminar talks in 6 countries since 2017.	
2023 May	Liverpool John Moores University, United Kingdom
2023 Mar	University of Waterloo, Ontario, Canada
2023 Feb	Universidade Federal do Rio Grande do Sul, Porto Alegre, Brasil
2022 Sept	University of Texas Rio Grande Valley, Texas, USA
2022 Jun	Curtin Institute of Radio Astronomy, Western Aus., Australia
2021 Mar	American Museum of Natural History, New York, USA
2021 Jan	Institute of Astrophysics-FORTH, Heraklion, Crete
2020 Feb	McGill Space Institute, Québec, Canada
2017 Feb	Gemini South Observatory, Coquimbo, Chile

## SELECTED CONFERENCE TALKS

– 17 talks since 2014.

2023 May	The 10th Microquasar Workshop: the various facets of extreme gravity, Heraklion, Crete
2022 Aug	Star Clusters at McMaster University, Ontario, Canada
2022 May	Intermediate Mass Black Holes: New Science From Stellar Evolution to Cosmology, San Juan, Puerto Rico
2021 Aug	Rubin Observatory Project & Community Workshop, Seattle, WA, USA
2021 Apr	LISA Canada Workshop, British Columbia, Canada
2020 Jan	235th American Astronomical Society Meeting, Hawaii, USA
2019 Mar	17th High Energy Astrophysics Division Meeting, California, USA
2014 Apr	Compact Objects in Michigan 2, Michigan, USA

## SELECTED PUBLIC TALKS

– 12 public talks since 2017.

2021	STEM Week, Vanier College, Québec, Canada
2021	Abrams Planetarium Night Sky Chat, Michigan, USA
2020	Quiet Adventures Symposium, Michigan, USA
2017	Capitol Area Astronomy Association, Michigan, USA
2017	Astronomy on Tap, Michigan, USA

## SELECTED OUTREACH AND VOLUNTEER ACTIVITIES

– Involved in 19 different outreach events since 2014.

2022	AstroMcGill Educator and Content Creator, Québec, Canada
2022	Carbondale Radio Physics, KDNK, Colorado, USA
2021	Co-organizer, McGill Space Institute Astronomy Trivia Night, Québec, Canada
2020	Science Briefing, NASA Universe of Learning, Maryland, USA
2020	Presenter, 2020 STEM Pathways for Girls conference, New Mexico, USA
2019	Event Supervisor, Science Olympiad State Level Astronomy division, Michigan, USA
2018	Primary Astronomy Organizer, MSU Science Festival Expo Days, Michigan, USA

## PUBLICATIONS

† *indicates students under my supervision*

### Refereed

28. M. Brumback et al., (including **K. Dage**), “Constraining the evolution of the unstable accretion disk in SMC X-1 with NICER”, 2023, The Astrophysical Journal
27. Amaro-Seoane et al., (including **K. Dage**), “Astrophysics with the Laser Interferometer Space Antenna”, 2023, Living Reviews In Relativity
26. C. Usher, **K. Dage**, et al., “Rubin Observatory LSST Stars Milky Way and Local Volume Star Clusters Roadmap”, 2023, Publications of the Astronomical Society of the Pacific
25. C.-P. Hu et al (including **K. Dage**), “Monitoring observations of SMC X-1’s excursions (MOOSE)-II: A new excursion accompanies spin-up acceleration”, 2023, Monthly Notices of the Royal Astronomical Society
24. S. Nair† et al (including **K. Dage**), “The X-ray Point Source Population Hosted by Globular Clusters in the Elliptical Galaxy NGC 4261”, 2023, Monthly Notices of the Royal Astronomical Society

23. The Rubin LSST TVS Science Collaboration (including **K. Dage**), “Rubin Observatory LSST Transients and Variable Stars Roadmap”, 2022, Publications of the Astronomical Society of the Pacific (submitted)
22. **K. Dage**, Y. Sun†, A. Kundu, S. Zepf, D. Haggard, “Far Ultra-Violet Insights Into NGC 1399’s Globular Cluster Population”, 2022, Monthly Notices of the Royal Astronomical Society
21. Wasundara Ranhari Athukoralalage† et al (including **K. Dage**), “Optical and X-ray Follow-Up to a Globular Cluster Ultraluminous X-ray Source in NGC 4472”, 2022, Monthly Notices of the Royal Astronomical Society
20. E. Thygesen†, Y. Sun†, J. Huang†, et al (including **K. Dage**), “Globular Cluster Ultraluminous X-ray Sources in the Furthest Early-Type Galaxies”, 2022, Monthly Notices of the Royal Astronomical Society
19. **K. Dage**, M. Brumback, J. Neilsen, C.-P. Hu, D. Altamirano, A. Bahramian, P. A. Charles, W. I. Clarkson, D. Haggard, R. C. Hickox, J. Kennea, “Monitoring Observations of SMC X-1’s Excursions (MOOSE) I: Programme Description and Initial High-State Spectral Results", 2022, Monthly Notices of the Royal Astronomical Society
18. E. Barbisan†, J. Huang† et al (including **K. Dage**), “Using Machine Learning to Identify Extragalactic Globular Cluster Candidates from Ground-Based Photometric Surveys of M87", 2022, Monthly Notices of the Royal Astronomical Society
17. S. J. Swihart, et al (including **K. Dage**), “4FGL J1120.0-2204: A Unique Gamma-ray Bright Neutron Star Binary with an Extremely Low Mass Proto-White Dwarf", 2022, The Astrophysical Journal
16. D. L. Tucker et al (including **K. Dage**), “SOAR/Goodman Spectroscopic Assessment of Candidate Counterparts of the LIGO–Virgo Event GW190814", 2022, The Astrophysical Journal
15. C. Kilpatrick et al (including **K. Dage**), “ The Gravity Collective: A Search for the Electromagnetic Counterpart to the Neutron Star-Black Hole Merger GW190814”, 2021, The Astrophysical Journal
14. **K. Dage**, N. Vowell†, E. Thygesen†, A. Bahramian, D. Haggard, K. Kovelakas, A. Kundu, T. J. Maccarone, J. Strader, R. Urquhart, S. E. Zepf, “Ultraluminous X-ray Sources in Seven Edge-On Spiral Galaxies", 2021, Monthly Notices of the Royal Astronomical Society
13. T. Jayasinghe et al (including **K. Dage**), “The Loudest Stellar Heartbeat: Characterizing the Most Extreme Amplitude Heartbeat Star System”, 2021, Monthly Notices of the Royal Astronomical Society
12. **K. Dage**, A. Kundu, E. Thygesen†, A. Bahramian, J.A. Irwin, D. Haggard, T.J. Maccarone, S. Nair†, M.B. Peacock, J. Strader, S.E. Zepf, “Three Ultraluminous X-ray Sources in NGC 1316”, 2021, Monthly Notices of the Royal Astronomical Society
11. S. Swihart et al (including **K. Dage**), “Discovery of a New Redback Millisecond Pulsar Candidate: 4FGL J0940.3-7610", 2021, The Astrophysical Journal
10. J. M. Miller (including **K. Dage**), “A New Candidate Transitional Millisecond Pulsar in the Sub-luminous Disk State: 4FGL J0407.7–5702", 2020, The Astrophysical Journal
9. S. Swihart et al (including **K. Dage**), “A New Likely Redback Millisecond Pulsar Binary with a Massive Neutron Star: 4FGL J2333.1-5527", 2020, The Astrophysical Journal
8. **K. Dage**, S.E. Zepf, E. Thygesen†, A. Bahramian, A. Kundu, M.B. Peacock, T. J. Maccarone, J. Strader, “X-Ray Spectroscopy of Newly Identified ULXs Associated With M87’s Globular Cluster Population", 2020, Monthly Notices of the Royal Astronomical Society
7. **K. Dage**, S.E. Zepf, A. Bahramian, J. Strader, Thomas J. Maccarone, M.B. Peacock, A. Kundu, M. Steele, C. Britt, “Slow Decline and Rise of the Broad [OIII] Emission Line in Globular Cluster Black Hole Candidate RZ2109”, 2019, Monthly Notices of the Royal Astronomical Society
6. E. Aydi, et al (including **K. Dage**), “Flaring, Dust Formation, And Shocks In The Very Slow Nova ASASSN-17pf (LMCN 2017-11a), 2019, The Astrophysical Journal
5. **K. Dage**, S.E. Zepf, M.B. Peacock, A. Bahramian, O. Noroozi†, A. Kundu, T.J. Maccarone, “X-Ray Spectral Variability of Ultraluminous X-Ray Sources in Extragalactic Globular Clusters”, 2019, Monthly Notices of the Royal Astronomical Society.



4. Strader, J., et al (including **K. Dage**), "Optical spectroscopy and demographics of redback millisecond pulsar binaries", 2018, The Astrophysical Journal
3. M. A. Tucker, et al (including **K. Dage**), "ASASSN-18ey: The Rise of a New Black-Hole X-ray Binary" 2018, The Astrophysical Journal
2. **K. Dage**, W.I. Clarkson, P.A. Charles, S. Laycock, I-C. Shih "A Search for Spin-Superorbital Period Correlation in SMC X-1", 2018, Monthly Notices of the Royal Astronomical Society.
1. **K. Dage**, S. E. Zepf, A. Bahramian, A. Kundu, T. J. Maccarone, M. B. Peacock, "X-Ray Variability from the Ultraluminous Black Hole Candidate X-ray Binary in the Globular Cluster RZ 2109", 2018, The Astrophysical Journal

## Unrefereed

9. **K. Dage** et al., "Extragalactic Star Cluster Science with the Nancy Grace Roman Space Telescope's High Latitude Wide Area Survey and the Vera C. Rubin Observatory", 2023, Roman CCS White Paper
8. J. Huang†, Y. Sun†, **K. Dage**, D. Haggard, "Probing M87 Globular Clusters for Flaring Ultraluminous X-Ray Sources", 2021, RNAAS, 5, 136
7. D. Tucker et al (including **K. Dage**), "LIGO/Virgo S190814bv: SOAR spectroscopy of DECAM candidates AT2019npw and AT2019num", 2019, GCN 25484
6. E. Aydi et al (including **K. Dage**), "SOAR classification of ASASSN-19qv as a classical nova in the SMC", The Astronomer's Telegram, No. 12907
5. J. Strader, L. Chomiuk, **K. Dage**; J.L. Prieto, K. Z. Stanek, " Spectroscopic classification of ASASSN-19kz as a young Type II supernova in NGC 2207", The Astronomer's Telegram, No. 12706
4. K.V. Sokolovsky et al (including **K. Dage**), "ASAS-SN Discovery of a Bright Candidate Microlensing Event ASASSN-19cq", 2019, The Astronomer's Telegram, No. 12495
3. S.K. Sarbadhicary, et al (including **K. Dage**), "SOAR optical spectroscopy of the Wolf-Rayet star WR96 during the dimming event", The Astronomer's Telegram, No. 12511
2. **K. Dage**, et al, "Spectroscopic Classification of SN 2018agk with SOAR/Goodman", 2018, The Astronomer's Telegram, No. 11433
1. A. Bahramian, J. Strader, **K. Dage**, "SOAR/Goodman optical spectroscopy of MAXI J1820+070", 2018, The Astronomer's Telegram, No. 11424