

Dr. Amy Reines

Assistant Professor of Physics, Montana State University

Curriculum Vitae

ADDRESS AND CONTACT INFORMATION

Department of Physics, Montana State University (MSU)
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EDUCATION

The University of Virginia, Charlottesville, VA, USA	
Ph.D. Astronomy	2011
M.S. Astronomy	2007
San Francisco State University, San Francisco, CA, USA	
M.S. Physics	2002
The University of Maryland, College Park, MD, USA	
B.S. Astronomy	1998

RESEARCH POSITIONS

Associate Professor, Department of Physics, Montana State University	Aug 2023 -
Assistant Professor, Department of Physics, Montana State University	Aug 2017 - present
Hubble Fellow, University of Michigan / National Optical Astronomy Observatory	2014-2017
Einstein Fellow, National Radio Astronomy Observatory	2011-2014
NASA Earth and Space Science Fellow, University of Virginia	2009-2011
Graduate Research Associate, University of Virginia	2005-2009
Graduate Research Associate, San Francisco State University	1998-2001

AWARDS AND HONORS

NSF CAREER Award	2023
NASA EPSCoR Research Award	2020
Outstanding Faculty Colleague Award, Department of Physics, Montana State University	2019
NASA Hubble Postdoctoral Fellowship	2014-2017
University of Michigan Society of Fellows offer (8 offers, 1027 applications)	2014
NSF Astronomy & Astrophysics Postdoctoral Fellowship offer	2014
NASA Einstein Postdoctoral Fellowship	2011-2014
Graduate NASA Earth and Space Science Fellowship	2009-2011

Z Society Edgar F. Shannon Award for the most accomplished graduate student in the College of Arts and Sciences, University of Virginia	2011
Allan T. Gwathmey Memorial Award for the best graduate student paper written on a fundamental problem in the physical sciences. Won 2 years in a row for Reines et al. 2010 and Reines et al. 2011. University of Virginia	2010-2011
1st Place, Huskey Graduate Student Research Expedition, University of Virginia	2011
Dissertation Acceleration Fellowship, University of Virginia	2010
Governor's Graduate Fellowship, University of Virginia	2006, 2008
Virginia Space Grant Consortium Aerospace Graduate Fellowship	2006-2008
Burbank Scholarship, San Francisco State University	1998-2000
Graduate Equity Fellowship, San Francisco State University	1999-2000
Dr. Yvonne Cagle, Alumna of the Year Scholarship, San Francisco State University	1999
University Scholarship, San Francisco State University	1999-2000
Dean's List, University of Maryland	1995-1998
College Park Scholar Award, University of Maryland	1996

RESEARCH INTERESTS

Supermassive black holes in dwarf galaxies and the origin of black hole seeds
 The evolution of galaxies and supermassive black holes
 Active galactic nuclei, impact on their host galaxies and star formation
 Dwarf starburst galaxies, super star clusters and the formation of globular clusters

CURRENT RESEARCH GROUP AT MSU

Dr. Hansung Gim	postdoctoral researcher
Mr. John Michael Eberhard	graduate student
Mr. Seth Kimbrell	graduate student
Ms. Fatemeh Salehirad	graduate student
Mr. Adonis Sanchez	graduate student
Ms. Megan Sturm	graduate student
Ms. Bayli Hayes	undergraduate student
Ms. Mahpara Tasnim	undergraduate student

PREVIOUS MENTEES AT MSU

Dr. Mallory Molina	postdoc/Ford Fellow at MSU, 2019-2022
Dr. Lilikoi Latimer	Ph.D. Physics MSU, Spring 2022
Dr. Zachary Schutte	Ph.D. Physics MSU, Spring 2022

Ms. Erin Kimbro
Ms. Deanta Kelly

B.S. Physics MSU, Spring 2020
B.S. Physics MSU, Spring 2019

PUBLICATIONS AND SCIENTIFIC IMPACT (AS OF 9/19/22)

Total Publications	55
Total Publications (lead author)	14
Citations	2699
Citations (lead author)	1430
H-index	29
H-index (lead author)	12

Journals:

Nature
The Astrophysical Journal Letters
The Astrophysical Journal
The Astronomical Journal
Monthly Notices of the Royal Astronomical Society
Publications of the Astronomical Society of Australia
Publications of the Astronomical Society of the Pacific
Bulletin of the American Astronomical Society

Abbreviation:

Nature
ApJ Letters
ApJ
AJ
MNRAS
PASA
PASP
BAAS

Invited Articles and Book Chapters:

4. Perspective: Hunting for massive black holes in dwarf galaxies
Reines, A.E. (2022), *Nature Astronomy*, 6, 26 (refereed)

3. Book Chapter: Science with an ngVLA: Local Constraints on Supermassive Black Hole Seeds
Plotkin, R. & **Reines, A.E.** 2018, "Science with a Next-Generation VLA", ed. E. J. Murphy, ASP, San Francisco, CA (refereed)

2. Review Article: Observational Signatures of High-Redshift Quasars and Local Relics of Black Hole Seeds
Reines, A.E. and Comastri, A. 2016, *PASA*, 33, 54 (refereed)

1. News and Views: Astrophysics: Giant black hole in a stripped galaxy
Reines, A.E. 2014, *Nature*, 513, 322

Refereed Journal Articles:

Underlined names indicate students and postdoctoral researchers mentored by Dr. Reines.

47. Hundreds of Low-mass Active Galaxies in the Galaxy and Mass Assembly (GAMA) Survey
Salehirad S., **Reines, A. E.** & Molina, M. (2022), *ApJ*, 937, 7.

46. Wandering Black Hole Candidates in Dwarf Galaxies and VLBI Resolution
Sargent, A.J., Johnson, M.C., **Reines, A.E.**, Secrest, N.J., van der Horst, A.J., Cigan, P.J., Darling, J. & Greene, J.E. (2022), *ApJ*, 933, 160.

45. Black-hole-triggered star formation in the dwarf galaxy Henize 2-10
Schutte, Z. & **Reines, A.E.** (2022), *Nature*, 601, 329.

44. The AGN Fraction in Dwarf Galaxies from eROSITA: First Results and Future Prospects
Latimer, L. J., **Reines, A. E.**, Bogdan, A., & Kraft, R. (2021), *ApJL*, 922, L40.

43. A Sample of Massive Black Holes in Dwarf Galaxies Detected via [Fe X] Coronal Line Emission: Active Galactic Nuclei and/or Tidal Disruption Events
Molina, M., **Reines, A. E.**, Latimer, L. J., Baldassare, V., & Salehirad, S. (2021), *ApJ*, 922, 155.

42. Toward a More Complex Understanding of Natal Super Star Clusters with Multiwavelength Observations
Costa, A. H., Johnson, K. E., Indebetouw, R., Finn, M. K., Brogan, C. L., & **Reines, A.E.** (2021), *ApJ*, 918, 76.

41. A Chandra and HST View of WISE-selected AGN Candidates in Dwarf Galaxies
Latimer, L. J., **Reines, A. E.**, Hainline, K. N., Greene, J. E., & Stern, D. (2021), *ApJ*, 914, 133.

40. Supermassive black holes in cosmological simulations I: M_{BH} - M -relation and black hole mass function
Habouzit, M., Li, Y., Somerville, R. S., Genel, S., Pillepich, A., Volonteri, M., Davé, R., Rosas-Guevara, Y., McAlpine, S., Peirani, S., Hernquist, L., Anglés-Alcázar, D., **Reines, A.E.**, Bower, R., Dubois, Y., Nelson, D., Pichon, C., & Vogelsberger, M. (2021), *MNRAS*, 503, 1940.

39. Clumpy Star Formation and AGN Activity in the Dwarf-Dwarf Galaxy Merger Mrk 709
Kimbrow, E., **Reines, A. E.**, Molina, M., Deller, A. T., & Stern, D. (2021), *ApJ*, 912, 89.

38. The Diverse Morphologies and Structures of Dwarf Galaxies Hosting Optically Selected Active Massive Black Holes
Kimbrell, S. J., **Reines, A. E.**, Schutte, Z., Greene, J. E., & Geha, M. (2021), *ApJ*, 911, 134.

37. Outflows, Shocks, and Coronal Line Emission in a Radio-selected AGN in a Dwarf Galaxy
Molina, M., **Reines, A. E.**, Greene, J. E., Darling, J., & Condon, J. J. (2021), *ApJ*, 910, 5.

36. Reionization with galaxies and active galactic nuclei

Dayal, P., Volonteri, M., Choudhury, T. R., Schneider, R., Trebitsch, M., Gnedin, N. Y., Atek, H., Hirschmann, M., & **Reines, A.E.** (2020), MNRAS, 495, 3065.

35. Populating the Low-mass End of the M_{BH} -sigma Relation
Baldassare, V., Dickey, C., Geha, M. & **Reines, A. E.** (2020), ApJ Letters, 898, 3.

34. High-mass X-ray binaries in nearby metal-poor galaxies: on the contribution to nebular He II emission
Senchyna, P., Stark, D., Mirocha, J., **Reines, A. E.**, Charlot, S., Jones, T., Mulchaey, J. (2020), MNRAS, 494, 941.

33. A New Sample of (Wandering) Massive Black Holes in Dwarf Galaxies from High Resolution Radio Observations
Reines, A. E., Condon, J., Darling, J. & Greene, J. (2020), ApJ, 888,36

32. The Black Hole - Bulge Mass Relation Including Dwarf Galaxies Hosting Active Galactic Nuclei
Schutte, Z., **Reines, A. E.** & Greene, J. (2019), ApJ, 887, 245

31. An X-ray + Radio Search for Massive Black Holes in Blue Compact Dwarf Galaxies
Latimer, L.J., **Reines, A. E.**, Plotkin, R. M., Russell, T. D., & Condon, J. J. (2019), ApJ, 884, 78

30. The Effect of AGNs on the Global H I Content of Isolated Low-mass Galaxies
Bradford, J. D., Geha, M. C., Greene, J. E., **Reines, A. E.**, & Dickey, C. M. (2018), The Astrophysical Journal, 861, 50.

29. The Association of Molecular Gas and Natal Super Star Clusters in Henize 2-10
Johnson, K. E., Brogan, C. L., Indebetouw, R., Testi, L., Wilner, D. J., **Reines, A. E.**, Chen, C.-H. R., & Vanzi, L. (2018), The Astrophysical Journal, 853, 125.

28. Hubble Space Telescope Imaging of the Active Dwarf Galaxy RGG 118
Baldassare, V. F., **Reines, A. E.**, Gallo, E., & Greene, J. E. (2017), The Astrophysical Journal, 850, 196.

27. High-redshift Galaxies and Black Holes Detectable with the JWST: A Population Synthesis Model from Infrared to X-Rays
Volonteri, M., **Reines, A. E.**, Atek, H., Stark, D. P., & Trebitsch, M. (2017), The Astrophysical Journal, 849, 155.

26. Hard X-Ray-selected AGNs in Low-mass Galaxies from the NuSTAR Serendipitous Survey
Chen, C.-T. J., Brandt, W. N., **Reines, A. E.**, Lansbury, G., Stern, D., Alexander, D. M., Bauer, F., Del Moro, A., Gandhi, P., Harrison, F. A., Hickox, R. C., Koss, M. J., Lanz, L., Luo, B., Mullaney, J. R., Ricci, C., & Trump, J. R. (2017), The Astrophysical Journal, 837, 48.

25. X-ray and Ultraviolet Properties of AGNs in Nearby Dwarf Galaxies
Baldassare, V. F., Reines, A. E., Gallo, E., & Greene, J. E. (2017), The Astrophysical Journal, 836, 20.
24. Mid-infrared Colors of Dwarf Galaxies: Young Starbursts Mimicking Active Galactic Nuclei
Hainline, K. N., Reines, A. E., Greene, J. E., & Stern, D. (2016), The Astrophysical Journal, 832, 119.
23. X-Ray Detected Active Galactic Nuclei in Dwarf Galaxies at $0 < z < 1$
Pardo, K., Goulding, A. D., Greene, J. E., Somerville, R. S., Gallo, E., Hickox, R. C., Miller, B. P., **Reines, A. E.**, & Silverman, J. D. (2016), The Astrophysical Journal, 831, 203.
22. Deep Chandra Observations of the Compact Starburst Galaxy Henize 2-10: X-Rays from the Massive Black Hole
Reines, A. E., Reynolds, M. T., Miller, J. M., Sivakoff, G. R., Greene, J. E., Hickox, R. C., & Johnson, K. E. (2016), The Astrophysical Journal, 830, L35.
21. Multi-epoch Spectroscopy of Dwarf Galaxies with AGN Signatures: Identifying Sources with Persistent Broad H α Emission
Baldassare, V. F., Reines, A. E., Gallo, E., Greene, J. E., Graur, O., Geha, M., Hainline, K., Carroll, C. M., & Hickox, R. C. (2016), The Astrophysical Journal, 829, 57.
20. The X-Ray Properties of Million Solar Mass Black Holes
Plotkin, R. M., Gallo, E., Haardt, F., Miller, B. P., Wood, C. J. L., **Reines, A. E.**, Wu, J., & Greene, J. E. (2016), The Astrophysical Journal, 825, 139.
19. Inferences on the Relations Between Central Black Hole Mass and Total Galaxy Stellar Mass in the High-redshift Universe
Volonteri, M., & **Reines, A. E.** (2016), The Astrophysical Journal, 820, L6.
18. Relations between Central Black Hole Mass and Total Galaxy Stellar Mass in the Local Universe
Reines, A. E., & Volonteri, M. (2015), The Astrophysical Journal, 813, 82.
17. A $\sim 50,000 M_{\odot}$ Solar Mass Black Hole in the Nucleus of RGG 118
Baldassare, V. F., Reines, A. E., Gallo, E., & Greene, J. E. (2015), The Astrophysical Journal, 809, L14.
16. Variable Hard-X-Ray Emission from the Candidate Accreting Black Hole in Dwarf Galaxy Henize 2-10
Whalen, T. J., Hickox, R. C., **Reines, A. E.**, Greene, J. E., Sivakoff, G. R., Johnson, K. E., Alexander, D. M., & Goulding, A. D. (2015), The Astrophysical Journal, 806, 37.

15. An X-Ray Selected Sample of Candidate Black Holes in Dwarf Galaxies
Lemons, S. M., Reines, A. E., Plotkin, R. M., Gallo, E., & Greene, J. E. (2015), The Astrophysical Journal, 805, 12.
14. An Emerging Wolf-Rayet Massive Star Cluster in NGC 4449
Sokal, K. R., Johnson, K. E., Indebetouw, R., & **Reines, A. E.** (2015), The Astronomical Journal, 149, 115.
13. Extended Structure and Fate of the Nucleus in Henize 2-10
Nguyen, D. D., Seth, A. C., **Reines, A. E.**, den Brok, M., Sand, D., & McLeod, B. (2014), The Astrophysical Journal, 794, 34.
12. A Candidate Massive Black Hole in the Low-metallicity Dwarf Galaxy Pair Mrk 709
Reines, A. E., Plotkin, R. M., Russell, T. D., Mezcuca, M., Condon, J. J., Sivakoff, G. R., & Johnson, K. E. (2014), The Astrophysical Journal, 787, L30.
11. High Resolution Radio and Optical Observations of the Central Starburst in the Low-metallicity Dwarf Galaxy II Zw 40
Kepley, A. A., **Reines, A. E.**, Johnson, K. E., & Walker, L. M. (2014), The Astronomical Journal, 147, 43.
10. Dwarf Galaxies with Optical Signatures of Active Massive Black Holes
Reines, A. E., Greene, J. E., & Geha, M. (2013), The Astrophysical Journal, 775, 116.
9. Parsec-scale Radio Emission from the Low-luminosity Active Galactic Nucleus in the Dwarf Starburst Galaxy Henize 2-10
Reines, A. E., & Deller, A. T. (2012), The Astrophysical Journal, 750, L24.
8. An actively accreting massive black hole in the dwarf starburst galaxy Henize2-10
Reines, A. E., Sivakoff, G. R., Johnson, K. E., & Brogan, C. L. (2011), **Nature**, 470, 66.
7. Ultraviolet+Infrared Star Formation Rates: Hickson Compact Groups with Swift and Spitzer
Tzanavaris, P., Hornschemeier, A. E., Gallagher, S. C., Johnson, K. E., Gronwall, C., Immler, S., **Reines, A. E.**, Hoversten, E., & Charlton, J. C. (2010), The Astrophysical Journal, 716, 556.
6. The Importance of Nebular Continuum and Line Emission in Observations of Young Massive Star Clusters
Reines, A. E., Nidever, D. L., Whelan, D. G., & Johnson, K. E. (2010), The Astrophysical Journal, 708, 26.
5. Probing Star Formation at Low Metallicity: The Radio Emission of Super Star Clusters in SBS 0335-052
Johnson, K. E., Hunt, L. K., & **Reines, A. E.** (2009), The Astronomical Journal, 137, 3788.

4. A New View of the Super Star Clusters in the Low-Metallicity Galaxy SBS 0335-052

Reines, A. E., Johnson, K. E., & Hunt, L. K. (2008), *The Astronomical Journal*, 136, 1415.

3. Emerging Massive Star Clusters Revealed: High-Resolution Imaging of NGC 4449 from the Radio to the Ultraviolet

Reines, A. E., Johnson, K. E., & Goss, W. M. (2008), *The Astronomical Journal*, 135, 2222.

2. The Infrared Properties of Hickson Compact Groups

Johnson, K. E., Hibbard, J. E., Gallagher, S. C., Charlton, J. C., Hornschemeier, A. E., Jarrett, T. H., & **Reines, A. E.** (2007), *The Astronomical Journal*, 134, 1522.

1. Optical Search for Extraterrestrial Intelligence: A Spectroscopic Search for Laser Emission from Nearby Stars

Reines, A. E., & Marcy, G. W. (2002), *Publications of the Astronomical Society of the Pacific*, 114, 416.

Unrefereed Publications:

4. The Habitable Exoplanet Observatory (HabEx) Mission Concept Study Final Report

Gaudi, S. et al. including **Reines, A. E.** (2020), eprint arXiv:2001.06683.

3. Local Constraints on Supermassive Black Hole Seeds

Plotkin, R., **Reines, A. E.**, Nyland, K., Darling, J., Gallo, E., & Greene, J. E. (2019), *BAAS*, 51, 3, 315

Astro2020: Decadal Survey on Astronomy and Astrophysics, science white papers

2. The Local Relics of of Supermassive Black Hole Seeds

Greene, J., Barth, A., Bellini, A., Bellovary, J., Holley-Bockelmann, K., Do, T., Gallo, E., Gebhardt, K., Gültekin, K., Haiman, Z., Hosek, M., Kim, D., Libralato, M., Lu, J., Nyland, K., Malkan, M., **Reines, A. E.**, Seth, A., Treu, T., Walsh, J., & Wrobel, J. (2019), *BAAS*, 51, 3, 83

Astro2020: Decadal Survey on Astronomy and Astrophysics, science white papers

1. Towards a high accuracy measurement of the local black hole occupation fraction in low mass galaxies

Gallo, E., Hodges-Kluck, E., Treu, T., Greene, J., Wilkes, B., Seth, A., **Reines, A. E.**, Baldassare, V., Plotkin, R., & Chandar, R. 2019, *BAAS*, 51, 3, 35

Astro2020: Decadal Survey on Astronomy and Astrophysics, science white papers

CONFERENCES - INVITED TALKS

"Origin, growth and feedback of black holes in dwarf galaxies"

Sept 2022

San Sebastian, Spain

"Black Holes at All Scales", Giant magellan Telescope

Sept 2022

Community Science Meeting, Sedona, AZ

<i>"Black Hole Initiative Conference 2022"</i> , Harvard University (missed; family emergency)	May 2022
<i>"Supermassive Black Holes: Formation, growth and evolution"</i> , Chile	Dec 2020
Press Conference: <i>"Wandering Massive Black Holes in Dwarf Galaxies"</i> , American Astronomical Society Meeting, Honolulu, HI	Jan 2020
<i>"The Scientific Quest for High Angular Resolution"</i> , American Astronomical Society Meeting, Honolulu, HI	Jan 2020
<i>"Black Hole Initiative Conference 2019"</i> , Harvard University	May 2019
<i>"The Accretion Signatures of the Earliest Black Holes in the Universe"</i> , Princeton Center for Theoretical Science, Princeton, NJ	Apr 2019
<i>"Science with HabEx: UV to Near-IR Space Astronomy in the 2030s"</i> , Flatiron Institute, Center for Computational Astrophysics, NY	Oct 2018
<i>"Unsolved Problems in Astrophysics and Cosmology"</i> , Budapest, Hungary	Jul 2018
<i>"The Early Growth of Supermassive Black Holes"</i> , Sexten, Italy	Jul 2018
<i>"Massive Black Holes in Evolving Galaxies"</i> , IAP, Paris, France	Jun 2018
<i>"Annual Meeting of the American Physical Society Northwest Section"</i> , Tacoma, WA	Jun 2018
<i>"Multi Messenger Observations of IMBHs with LISA"</i> , American Astronomical Society Meeting, Washington, D.C.	Jan 2018
<i>"AGN in Dwarf Galaxies"</i> , American Astronomical Society High Energy Astrophysics Division Meeting, Sun Valley, ID	Aug 2017
<i>"Elusive AGN in the Next Era"</i> , George Mason University	Jun 2017
<i>"Breakthrough Discuss"</i> , Stanford University	Apr 2016
<i>"Supermassive Black Hole Formation and Feedback"</i> , Annapolis, MD	Oct 2015
Review Talk: <i>"First Stars, Galaxies and Black Holes"</i> , Groningen, Netherlands	Jun 2015
<i>"The Growth of the First Supermassive Black Holes"</i> , Tenerife, Spain	Jun 2015
<i>"Unveiling the AGN/Galaxy Evolution Connection"</i> , Puerto Varas, Chile	Mar 2015
Press Conference: <i>"Giant Black Holes Found in Dwarf Galaxies"</i> , American Astronomical Society Meeting, Washington D.C.	Jan 2014
<i>"Astronomy Fellows at the Frontiers of Science"</i> , Northwestern University	Sep 2011
Press Conference: <i>"A Supermassive Black Hole in the Dwarf Starburst Galaxy Henize 2-10"</i> , American Astronomical Society Meeting, Seattle, WA	Jan 2011

CONFERENCES - CONTRIBUTED TALKS

<i>"Shining from the Heart of Darkness: Black Hole Accretion and Jets"</i> , Kathmandu	Oct 2016
<i>"Cosmic Dawn of Galaxy Formation"</i> , IAP, Paris, France	Jun 2016
<i>"Hubble Fellows Symposium"</i> , Baltimore, MD	May 2016
<i>"AGN vs. Star Formation: The Fate of the Gas in Galaxies"</i> , Durham, UK	Jul 2014
<i>"The X-ray Universe 2014"</i> , Dublin, Ireland	Jun 2014

<i>"Multiwavelength AGN Surveys and Studies"</i> , Byurakan, Armenia	Oct 2013
<i>"Black Hole (g)Astronomy - Exploring the Different Flavors of Accretion"</i> , Italy	Sep 2013
<i>"Massive Black Holes: Birth, Growth and Impact"</i> , KITP, Santa Barbara	Aug 2013
<i>"Black Hole Fingerprints: Dynamics, Disruptions and Demographics"</i> , Utah	Mar 2013
<i>"Black Holes by the Black Sea"</i> , Istanbul, Turkey	Jun 2012
<i>"Near-Field Cosmology as a Probe of Early Universe, Dark Matter and Gravity"</i> , MD	Nov 2011
<i>"Single and Double Black Holes in Galaxies"</i> , University of Michigan	Aug 2011
<i>"National Radio Astronomy Observatory Postdoc Symposium"</i> , NRAO	2012, 2013, 2014
<i>"Einstein Fellows Symposium"</i> , Harvard Center for Astrophysics	2011, 2012, 2013
<i>"American Astronomical Society Winter Meeting"</i> , various locations	2011-2020

INVITED COLLOQUIA AND SEMINARS

University of Florida	Nov 2022
West Virginia University (remote)	Nov 2022
University of Idaho (remote)	Oct 2022
Institute of Astrophysics of Andalusia (remote)	Sep 2022
University of Nevada, Reno	Apr 2022
University of Kentucky (remote)	Feb 2022
Washington State University (remote)	Oct 2021
University of Sheffield (remote)	May 2021
Idaho State University (remote)	Oct 2020
University of Arizona (remote)	Oct 2020
University of Connecticut (remote)	Oct 2020
Texas A&M	Feb 2020
Leibniz Institute for Astrophysics Potsdam, Germany	May 2019
Louisiana State University	May 2019
University of Utah	Mar 2019
University of Arkansas	Feb 2019
Northwestern University	Mar 2018
University of Colorado, Boulder	Oct 2017
University of Maryland, College Park	Mar 2017
Montana State University	Mar 2017
University of Toledo	Feb 2017
Space Telescope Science Institute, Baltimore, MD	Feb 2017
University of Victoria	Jan 2017
University of California, Santa Cruz	Mar 2016

Steward Observatory	Nov 2015
University of Illinois Urbana-Champaign	Dec 2014
California Institute of Technology	Nov 2014
Johns Hopkins University	Oct 2014
University of Wisconsin, Madison	Sep 2014
University of California, Los Angeles	Apr 2014
Georgia Institute of Technology	Feb 2014
Michigan State University	Jan 2013
University of Michigan	Jan 2013
Princeton University	Oct 2012
University of Texas at Austin	Sep 2011
Yale University	May 2011

OTHER INVITED TALKS

Guest Speaker: Spanish Peaks Mountain Club, Big Sky, MT	Feb 2023
Public Talk: Science Inquiry Series, Museum of the Rockies, Bozeman, MT	May 2021
Public Talk: NASA's Universe of Learning Science Briefing from the AAS Meeting	Jan 2020
Guest Speaker: Honors College Freshman Research Symposium, MSU	Sep 2019
Guest Speaker: Honors College Freshman Research Symposium, MSU	Oct 2018
Public Talk: Rising Stars in the College of Letters and Science, Bozeman, MT	Apr 2018
Public Talk: Astronomy on Tap, Bozeman, MT	Feb 2018
Guest Speaker: Women in Science and Engineering Seminar Series, MSU	Dec 2017
Guest Speaker: Honors College Freshman Research Symposium, MSU	Oct 2017

GRANTS FUNDED AS PRINCIPLE INVESTIGATOR (~\$3.25 MILLION TOTAL)

19. "CAREER: Massive Black Holes in Dwarf Galaxies" NSF Research Award	\$749,885 2023
18. "Dwarf Galaxies with Radio-Selected (and Sometimes Wandering) Massive Black Holes" Hubble Space Telescope, Cycle 29	\$97,297 2022
17. "Dwarf Galaxies with Radio-Selected Massive Black Holes" Hubble Space Telescope, Cycle 29	\$79,751 2022
16. "Dwarf Irregular Galaxies with Candidate AGN" Chandra X-ray Observatory, Cycle 23	\$75,659 2022
15. "Dwarf Galaxies with Radio-Selected (and Sometimes Wandering) Massive Black	

<i>Holes</i>	\$93,050
Chandra X-ray Observatory, Cycle 23	2022
14. <i>"The Origin of Supermassive Black Holes"</i>	\$750,000
NASA EPSCoR Research Award	2020
13. <i>"Testing mid-IR AGN Selection in Dwarf Galaxies with Chandra and HST"</i>	\$104,856
Hubble Space Telescope, Cycle 26	2019
12. <i>"Testing mid-IR AGN Selection in Dwarf Galaxies with Chandra and HST"</i>	\$103,460
Chandra X-ray Observatory, Cycle 20	2019
11. <i>"The Origin of Supermassive Black Holes"</i>	\$383,394
NASA Hubble Postdoctoral Fellowship	2014-2017
10. <i>"The Structures of Dwarf Galaxies Hosting Massive Black Holes"</i>	\$86,391
Hubble Space Telescope, Cycle 23	2016
9. <i>"Probing the Growth of Massive Black Holes in Dwarf Galaxies with Chandra and HST"</i>	\$57,013
Hubble Space Telescope, Cycle 22	2016
8. <i>"AGN-Triggered Star Formation in the Dwarf Galaxy Henize 2-10?"</i>	\$70,912
Chandra X-ray Observatory, Cycle 15	2015
7. <i>"Probing the Growth of Massive Black Holes in Dwarf Galaxies with Chandra and HST"</i>	\$62,963
Chandra X-ray Observatory, Cycle 16	2015
6. <i>"Confirming the AGN in a Low-Metallicity Dwarf Galaxy with the HSA and HST"</i>	\$11,625
Hubble Space Telescope, Cycle 22	2015
5. <i>"Probing the Early Evolution of Galaxies and Massive Black Holes with Nearby Star-Forming Dwarfs"</i>	\$309,754
NASA Einstein Postdoctoral Fellowship	2011-2014
4. <i>"Confirming the First Supermassive Black Hole in a Dwarf Starburst Galaxy"</i>	\$36,526
Hubble Space Telescope, Cycle 19	2013
3. <i>"Probing the Early Evolution of Galaxies and Massive Black Holes with Nearby Star-Forming Dwarfs"</i>	\$52,611
Chandra X-ray Observatory, Cycle 13	2011
2. <i>"The Birth of Super Star Clusters"</i>	\$60,000
NASA Earth and Space Science Graduate Fellowship	2009-2011

1. "Unveiling the Early Evolution of Super Star Clusters through Multi-wavelength Observations of Starburst Galaxies"	\$15,000
Virginia Space Grant Graduate Fellowship	2006-2008

GRANTS FUNDED AS CO-INVESTIGATOR (~\$75,000 TOTAL)

2. "X-ray Ionized Nebulae in Nearby Dwarf Galaxies"	\$40,219
Chandra X-ray Observatory, Cycle 19	2018

1. "Searching for Intermediate-Mass Black Holes in Extremely Metal-Poor Galaxies"	\$34,460
Chandra X-ray Observatory, Cycle 18	2017

STUDENT/POSTDOC-LED GRANTS FUNDED AS FACULTY ADVISOR (~\$150,000 TOTAL)

11. "Radio AGNs in Dwarf Galaxies with VLASS", John Michael Eberhard (grad)	\$9,000
Montana Space Grant Consortium Graduate Fellowship	2022

10. "The First Wandering Black Holes", Mallory Molina (postdoc)	\$50,000
Ford Foundation Postdoctoral Fellowship	2021

9. "Searching for Massive Black Holes in Dwarf Galaxies", Lilikoi Latimer (grad)	\$9,000
Montana Space Grant Consortium Graduate Fellowship	2020

8. "Variable Sources in Dwarf Galaxies", Erin Kimbro (post-bac.)	\$6,000
Montana Space Grant Consortium Summer Internship	2021

7. "A Statistical Approach to Star Formation and Quenching in the Local Universe"	\$40,000
Mallory Molina (postdoc), NASA's Swift Observatory, Cycle 16	2020

6. "The Structures of Dwarf Galaxies Hosting AGNs", Seth Kimbrell (grad)	\$9,000
Montana Space Grant Consortium Graduate Fellowship	2020

5. "Hubble Space Telescope Observations of Mrk 709", Erin Kimbro (undergrad)	\$6,000
Montana Space Grant Consortium Summer Internship	2020

4. "The Origin and Evolution of Supermassive Black Holes", Zachary Schutte (grad)	\$9,000
Montana Space Grant Consortium Graduate Fellowship	2019

3. "Hubble Space Telescope Observations of Mrk 709", Erin Kimbro (undergrad)	\$7,300
Montana Space Grant Consortium Summer Internship	2019

2. "A Survey of AGNs in the NSC Using Optical Variability", Erin Kimbro (undergrad)	\$1,800
MSU Undergraduate Scholars Program Scholarship	2018

1. MSU Women in Physics Grant, Madian Nelson and Demi St John (grads)	\$400
American Physical Society	2018

SELECTED PRESS

- Hubble Finds a Black Hole Igniting Star Formation in a Dwarf Galaxy* 2022
NASA (includes video): <https://www.nasa.gov/feature/goddard/2022/hubble-finds-a-black-hole-igniting-star-formation-in-a-dwarf-galaxy>
- Montana State University researchers uncover black hole creating stars* 2022
Bozeman Daily Chronicle: https://www.bozemandailychronicle.com/news/education/montana-state-university-researchers-uncover-black-hole-creating-stars/article_dedd3f8b-085a-5e10-84f2-f78c7c64304a.html
- A black hole fueling star birth has scientists doing a double-take* 2022
CNN: <https://www.cnn.com/2022/01/21/world/hubble-black-hole-star-formation-scn/index.html>
- A black hole is giving birth to stars, NASA finds* 2022
Independent: <https://www.independent.co.uk/space/nasa-black-hole-stars-henize-b1996473.html>
- NASA telescope finds black hole contributing to star formation* 2022
The Hill: <https://thehill.com/changing-america/enrichment/education/590811-nasa-telescope-finds-black-hole-contributing-to-star/>
- Hubble Finds a Black Hole Igniting Star Formation in a Dwarf Galaxy* 2022
Hubblesite: <https://hubblesite.org/contents/news-releases/2022/news-2022-002>
- Tiny Galaxies Reveal Secrets of Supermassive Black Holes* 2022
Quanta Magazine: <https://www.quantamagazine.org/tiny-galaxies-reveal-secrets-of-supermassive-black-holes-20220314/>
- Dwarf Galaxies Shed Light on Black Hole Origins* 2022
Sky & Telescope: <https://skyandtelescope.org/astronomy-news/dwarf-galaxies-shed-light-on-black-hole-origins/>
- Wandering Black Holes Found in Dwarf Galaxies Less Than Billion Light Years from Earth* 2020
Newsweek: <https://www.newsweek.com/wandering-black-holes-found-dwarf-galaxies-billion-light-years-earth-1480523>
- More big black holes found in small galaxies* 2020
Sky & Telescope: <https://skyandtelescope.org/astronomy-news/more-big-black-holes-found-in-small-galaxies/>
- The Smallest Galaxies Have Off-Kilter Black Holes, But Astronomers Know Why* 2020
Forbes: <https://www.forbes.com/sites/startswithabang/2020/01/06/the-smallest-galaxies-have-off-kilter-black-holes-but-astronomers-know-why/#18541fa54d2c>
- Astronomers discover dwarf galaxies with massive black holes* 2020
The Week: <https://www.theweek.in/news/sci-tech/2020/01/08/Astronomers-discover-dwarf-galaxies-with-massive-black-holes.html>
- Astronomers Find Wandering Massive Black Holes in Dwarf Galaxies* 2020

National Radio Astronomy Observatory: <https://public.nrao.edu/news/wandering-black-holes-dwarf-galaxies/>

Big black holes can settle in the outskirts of small galaxies 2019

Science News: <https://www.sciencenews.org/article/big-black-holes-can-settle-outskirts-small-galaxies>

Not all Black Holes that Wander are Lost 2019

Astrobiters: <https://astrobiters.org/2019/10/24/not-all-black-holes-that-wander-are-lost/>

Astronomers find 'teeny supermassive black hole' 2015

The Telegraph: <https://www.telegraph.co.uk/news/science/space/11797938/Astronomers-find-teeny-supermassive-black-hole.html>

Oxymoronic Black Hole Provides Clues to Growth 2015

NASA: <https://www.nasa.gov/press-release/oxymoronic-black-hole-provides-clues-to-growth>

Astronomers find a teeny-tiny supermassive black hole 2015

Washington Post: <https://www.washingtonpost.com/news/speaking-of-science/wp/2015/08/11/astronomers-find-a-teeny-tiny-supermassive-black-hole/>

What are Dwarf Galaxies Teaching us about Black Holes? May 2014

Astronomy Magazine, print edition

Dwarf Galaxies Give Clues to Origin of Supermassive Black Holes 2014

National Radio Astronomy Observatory: <https://public.nrao.edu/news/dwarf-galaxies-give-clues-to-black-hole-origins/>

Galactic Runts Carry Beefy Black Holes 2014

Sky & Telescope: <https://www.skyandtelescope.com/astronomy-news/galactic-runts-carry-beefy-black-holes/>

'Missing link' black holes could be hiding in dwarf galaxies 2014

Christian Science Monitor: <https://www.csmonitor.com/Science/2014/0108/Missing-link-black-holes-could-be-hiding-in-dwarf-galaxies>

Hole's on First? New Evidence Shows Black Hole Growth Preceding Galactic Formation 2011

Scientific American: <https://www.scientificamerican.com/article/dwarf-galaxy-black-hole/>

Huge Black Hole Found in Dwarf Galaxy 2011

National Geographic: <https://news.nationalgeographic.com/news/2011/01/110110-dwarf-galaxy-black-holes-universe-science-space/>

Surprise: Dwarf Galaxy Harbors Supermassive Black Hole 2011

Chandra X-ray Observatory: http://chandra.harvard.edu/press/11_releases/press_011011.html

Astrophysics: Big black hole found in tiny galaxy 2011

Nature News & Views: <https://www.nature.com/articles/470045a>

MONTANA STATE UNIVERSITY NEWS STORIES

Montana State graduate student discovers hundreds of small galaxies with supermassive black holes Sept 2022
<https://www.montana.edu/news/22283/>

Montana State research shows creative side of massive black holes Jan 2022
<https://www.montana.edu/news/21798/montana-state-research-shows-creative-side-of-massive-black-holes>

Ford Fellow Mallory Molina pioneering method to search for black holes Jan 2022
<https://www.montana.edu/news/21763/ford-fellow-mallory-molina-pioneering-method-to-search-for-black-holes>

Mallory Molina awarded Ford Fellowship for astrophysics research, diversity efforts July 2021
<https://www.montana.edu/news/21323/mallory-molina-awarded-ford-fellowship-for-astrophysics-research-diversity-efforts>

Staring into the abyss May 2021
<https://www.montana.edu/news/mountainsandminds/21172/staring-into-the-abyss>

Physics Nobel announcement inspires black hole researchers at MSU Oct 2020
<https://www.montana.edu/news/20500>

Montana State receives NASA grant to aid search for origin of supermassive black holes
<https://www.montana.edu/news/20457/montana-state-receives-nasa-grant-to-aid-search-for-origin-of-supermassive-black-holes> Sept 2020

Montana State astrophysicist finds massive black holes wandering around dwarf galaxies
<https://www.montana.edu/news/19511/montana-state-astrophysicist-finds-massive-black-holes-wandering-around-dwarf-galaxies> Jan 2020

COMPETITIVE TELESCOPE USAGE

James Webb Space Telescope (NASA)	JWST
Hubble Space Telescope (NASA)	HST
Chandra X-ray Observatory (NASA)	CXO
Very Large Array (NSF)	VLA
Atacama Large Millimeter/submillimeter Array (NSF)	ALMA
Very Long Baseline Array (NSF)	VLBA
Long Baseline Array	LBA
Spitzer Space Telescope (NASA)	Spitzer
Gemini Observatory	Gemini
Apache Point Observatory	APO

ACCEPTED TELESCOPE PROPOSALS AS PRINCIPLE INVESTIGATOR

Dwarf Galaxies with Radio-Selected Massive Black Holes	HST
The Structures of Dwarf Galaxies Hosting Massive Black Holes	HST
Confirming the First Supermassive Black Hole in a Dwarf Starburst Galaxy	HST
Dwarf Galaxies with Radio-Selected (& Sometimes Wandering) Massive Black Holes	CXO/HST
Testing Mid-Infrared AGN Selection in Dwarf Galaxies with Chandra & HST	CXO/HST
Probing the Growth of Massive Black Holes in Dwarf Galaxies with Chandra & HST	CXO/HST
Dwarf Irregular Galaxies with Candidate AGN	CXO
AGN-Triggered Star Formation in the Dwarf Galaxy Henize 2-10?	CXO
Probing the Early Evolution of Galaxies and Massive Black Holes	CXO/VLA
A Radio Search for Massive Black Holes in Dwarf Galaxies	VLA
Supermassive Black Holes in Dwarf Galaxies	VLA
Feeding the Massive Black Hole in the Dwarf Starburst Galaxy Henize 2-10	ALMA
Confirming the AGN in a Low-Metallicity Dwarf Galaxy with the HSA and HST	VLBA/HST
Probing the Enigmatic Nuclear Source in the Dwarf Galaxy He 2-10 with the LBA	LBA
Emerging Massive Star Clusters in NGC 4449	APO

ACCEPTED TELESCOPE PROPOSALS AS CO-INVESTIGATOR

Revealing Low Luminosity Active Galactic Nuclei (ReveaLLAGN)	JWST
Studying the nuclear morphology of a dwarf galaxy with a 50,000 solar mass black hole	HST
Probing the Birth of Super Star Clusters with NICMOS	HST
Multiwavelength Characterization of Candidate Black Holes in Dwarf Galaxies	CXO/HST/VLA
Searching for intermediate-mass black holes in extremely metal-poor galaxies	CXO
A candidate 30,000 solar mass black hole	CXO
Radio Clarification of a Double X-ray Source in a Metal-poor dwarf galaxy	VLA/CXO
Water maser emission and positive black hole feedback in the dwarf galaxy He 2-10	VLA
Searching for radio emission in variability-selected AGN in low-mass galaxies	VLA
Very Small AGN and the Fundamental Plane of Black Hole Activity	VLA
The Physical Environment of Nascent Super Star Clusters	ALMA
A Statistical Approach to Star Formation and Quenching in the Local Universe	Swift
The Formation and Early Evolution of Star Clusters	Spitzer
Confirming the First Sample of Wandering Black Holes in Dwarf Galaxies	Gemini
The Search for Low-Mass Black Holes	APO

TEACHING ACTIVITIES

Astronomy 110: Mysteries of the Sky, Montana State University	Spring 2023
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Astronomy 372: Extragalactic Astronomy, Montana State University	Fall 2022
Physics 435: Astrophysics, Montana State University	Spring 2018-2022
Astronomy 371: Solar System Astronomy, Montana State University	Fall 2018-2021
Center for Astronomy Education Teaching Excellence Workshop (participant)	2015
Teaching Assistant, astronomy night labs, University of Virginia	2005-2006
Math Advantage Tutoring, owner and tutor, Washington DC area	2003-2005
English Teacher in Hungary and Austria	2002-2003
Physics 122: Electricity and Magnetism Lab, San Francisco State University	1998
Astronomy 116: Astronomy Lab, San Francisco State University	1998

UNIVERSITY AND DEPARTMENTAL SERVICE (MONTANA STATE UNIVERSITY, DEPARTMENT OF PHYSICS)

University Graduate Council , VP and College of Letters and Sciences Faculty Rep.	Fall 2022-
Graduate Curriculum Committee, Chair	Fall 2022-
Graduate Committee Member (42 students total, Chair of 8)	2017-present
Women+ in Physics, Chair	2017-present
Committee on Environment and Inclusion	2020-present
Faculty Search Committee	2019-2020, 2021-2022
Graduate Recruiting Committee	2020-2022
Virtual Graduate School Recruitment Fair (presenter for MSU Physics)	2020-2022
Physics Virtual Visit Day for prospective graduate students	2022
Graduate Curriculum Committee	2018-2019, 2020-2021
Ran MSU booth at the American Astronomical Society Graduate School Fair, Hawaii	2020
Graduate Admissions Committee	2019-2021
Colloquium Committee	2018-2021
Physics Degree with Astronomy Option Committee, member/Chair	2018-2021
Art of Physics and Physics of Art, Faculty Mentor	2018-2019

DIVERSITY, EQUITY AND INCLUSION EFFORTS AND ACTIVITIES

Member of the Committee on Environment and Inclusion, Physics, MSU	2020-present
Towards a More Inclusive Astronomy, MSU chapter, faculty advisor	2020-present
Women+ in Physics Group, Creator and Organizer, Montana State University	2017-present
Inclusive Pedagogy Series Workshop 2, Universal Design for Learning, MSU (participant)	2021
Equity in Graduate Admissions Workshop at Montana State University (participant)	2020
Discussion with Gender Minorities at Steward (GEMS) group at Steward Observatory	2020
Brought in Dr. Alison Coil (UCSD) to give a talk at MSU on unconscious bias	2019
Made "Beyond Curie" Poster Exhibit featuring notable women in physics, astronomy	2018

and engineering; displayed near large physics lecture room (Barnard 103) at MSU.

Women in Science and Engineering Seminar Series, Guest Speaker, Montana State U. 2017

Career Day at Irving Elementary School in Bozeman, Guest Speaker 2017

"How the Universe Works", Featured scientist on TV show (season 3, episode 7) 2014

"Beyond the Visible: The Story of the Very Large Array", Featured scientist 2013
in film shown at the visitor center and online (narrated by Jodie Foster)

PROFESSIONAL SERVICE AND ACTIVITIES

External Reviewer for James Webb Space Telescope Large Proposals 2021

Reviewer for North Carolina Space Grant Proposals 2020

Organizing Committee, "James Webb Space Telescope Master Class", MSU 2020

Scientific Organizing Committee, "Accretion Signatures onto the Earliest Black Holes in the Universe", Workshop at Princeton University 2019

Scientific Organizing Committee for Special Session, "Dwarf Galaxies Near and Far", European Week of Astronomy & Space Science Meeting, Lyon, France 2019

Reviewer of Astro2020 Science White Paper, "Where are the Intermediate Mass Black Holes", Bellovary et al. 2019

External Reviewer for Hubble Space Telescope Large Proposals 2018

Proposal Reviewer for Gemini Observatory 2017

Program Organizer for Special Session on "AGN in Dwarf Galaxies", American Astronomical Society High Energy Astrophysics Division Meeting 2017

Member of the Hubble Fellowship Selection Committee 2016

Reviewer for the NASA Earth and Space Science Fellowship 2015

Science Review Panel Member for the National Radio Astronomy Observatory 2015-2016

Professional Skills Development Workshop, American Physical Society (participant) 2015

Aspen Center for Physics Program, "Dwarf Galaxies as Cosmological Probes" 2014

Peer Review Panel Member for the Chandra X-ray Observatory 2013

Kavli Institute for Theoretical Physics Program, "A Universe of Black Holes" 2013

Local Organizing Committee, "Transformational Science with ALMA: The Birth and Feedback of Massive Stars, Within and Beyond the Galaxy", NRAO 2008

Referee for various journals including *Nature*, *The Astrophysical Journal*, *The Astrophysical Journal Letters*, *Monthly Notices of the Royal Astronomical Society* ongoing