Michael M. Fausnaugh

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Research Expertise

Time Domain Astronomy, Supermassive Black Holes, Astrophysical Transients

Current Position

Reseach Scientist, Massachusetts Institute of Technology — 2017–present

Responsibilities:

- Data Analysis and Quality Assurance for NASA's TESS mission
- Mission and Observation Planning for TESS
- Original Research Programs

Education

Ph.D., Astronomy, The Ohio State University; Advisor: Prof. Bradley Peterson — 2017
M.S., Astronomy, The Ohio State University — 2014
B.A., History of Math and Science, Philosophy, St. John's College, Santa Fe, NM — 2011

Professional Experience

Six **first author** papers accepted (147 citations)
68 **papers** total, 15 minor publications
Data Release Notes for NASA's TESS mission, **lead author** — 2018–present
Authored a *Nature Astronomy* "News and Views" article (unrefereed) — 2019
Referee for *Nature*, leading astrophysics journals (*Nature Astronomy*, *ApJ*, *MNRAS*, *Astronomy & Astrophysics*, *PASP*), and general journal *Frontiers* — 2016–present
Chair and Organizer for the special session "TESS and Transient Science" at AAS 235 — Jan 2020
Co-Chair of LOC for the New England Regional Quasar and AGN Meeting — May 2019
Mentor for 2 graduate students and 3 undergraduates — 2017–present

Honors and Awards

NASA Silver Achievement Award for the TESS Mission — Sept 2019
OSU Hayes Research Forum, 2nd place Oral Presentation — March 2017
OSU Markowitz Award for Excellence in Observational Astronomy — 2016–2017
OSU Graduate School Presidential Fellow — 2016–2017
St. John's College Award for Sustained Academic Excellence — May 2011
St. John's College ARIEL Internship — May 2011

Presentations

Invited Talks

1. AAS 235 Special Session "TESS and Transient Science." Honolulu, HI. — Jan 2020
2. "One Year for TESS: Early Findings and the Future Ahead." Northrop Grumman Innovation Systems, Sterling, VA. — April 2019
3. CCAP Summer Seminar, The Ohio State University. Columbus, OH. — June 2016
4. Galaxy and Cosmology Seminar. Harvard-Smithsonian Center for Astrophysics. Cambridge, MA. — Nov 2016

TESS Contributed Research

5. TESS Science Conference. MIT. Cambridge, MA. Aug 2019
6. Meeting of the American Astronomical Society #233. Seattle, WA. Jan 2019
7. TESS Science Meeting. MIT. Cambridge, MA. Oct. 2018

AGN Contributed Research

8. NERQUAM 2019. MIT. Cambridge, MA. May 2019
9. AGN STORM Research Meeting. Atlanta, GA. Aug 2017
10. Hayes Research Forum. The Ohio State University. Columbus, OH. March 2017
11. AGN Research Group Meeting. Space Telescope and Science Institute. Baltimore, MD. Feb 2017
12. MIT Kavli Institute Research Lunch. Cambridge, MA. Jan 2017
13. Meeting of the American Astronomical Society #229. Grapevine, TX. Jan 2017
14. AGN STORM Workshop. Reykjavik, Iceland. July 2016
15. Great Lakes Quasar Symposium, Western University. London, Ontario. May 2016
16. Narayan Research Group, Harvard-Smithsonian Center for Astrophysics. Cambridge, MA. April 2016
17. Quasar Research Group Meeting, Harvard-Smithsonian Center for Astrophysics. Cambridge, MA. April 2016
18. AGN Research Group Meeting. Space Telescope and Science Institute. Baltimore, MD. March 2016
19. AGN STORM Workshop. Columbus, OH. July 2015
20. Meeting of the American Astronomical Society #225. Seattle, WA. Jan 2015
21. AGN Research Retreat. University of St. Andrews. St. Andrews, Scotland. Jan 2015
22. Catolica Workshop. The Ohio State University. Columbus, OH. May 2014
23. Spitz Summer Institute, planetarium workshop/training. Spitz Inc. Chadds Ford, PA. July 2013

Mentoring and Teaching

Mentor for MIT Graduate Students: 2019–present

Guided dissertations, outlined and managed research projects.

- Akshata Krishnamurthy (2019), Rahul Jayaraman (2019–present)

Supervisor through MIT Undergraduate Research Opportunity Program: 2017–present

Designed and managed research/programming projects, introduced students to best research practices.

- Nadia Dimitrova (2017), Ally Hong (2018–present), Jason Yang (2019–present)

Graduate Teaching Associate, The Ohio State University: 2012–2013

Graded exams, designed and lead review sessions.

- Astro 2291, Intro to Astronomy and Planets (calculus-based, Autumn 2012)
- Astro 1161, Intro to Astronomy and the Solar System (Spring 2013)

Head Laboratory Assistant, St. John's College: 2010–2011

Supervised and demonstrated classroom practica, developed and documented pedagogical experiments.

Laboratory Assistant, St. John's College: 2009–2010

Supervised and demonstrated classroom practica.

Observing Experience

Space-based

Transiting Exoplanet Survey Satellite

Monthly mission planning (2018–present):

- Selected targets and guide stars
- Performed quality checks, diagnostics, and engineering validation
- Assessed and reported guiding performance and pointing stability

Ground-based

Total:	119 nights	(81 queue, 38 classical)
Large Binocular Telescope:	54 nights	2013-2016
MDM 2.4m Hiltner:	24 nights	2012-2015
MDM 1.3m McGraw:	18 nights	2013-2014
CTIO SMARTS 1.3m:	16 nights	2015
VERITAS (γ-ray observatory):	7 nights	2011

Selected Outreach

Guided tour of the MIT TESS Payload Operations Center	July 2018
AAS 231 Hyperwall Presentation	Jan 2018
Upper Arlington Library Summer Astronomy Series	June 2014, 2015, 2016
Presented 2-4 planetarium shows per month.	2013-2016
OSU Planetarium: Wrote the following shows:	2013–2015

- *OSU Planetarium Grand Reopening, The Sky Tonight.*
- *Journey through the Solar System.*
- *The Autumn Sky: Hidden Treasures.*

Hosted a high school student for 1 day	May 2014
4-H Science Saturday	April 2013
Wickliffe Elementary Space Day	Jan 2013

Publications

First Author

1. "Continuum Reverberation Mapping of the Accretion Disks in Two Seyfert 1 Galaxies", M. M. Fausnaugh et al. (72 authors), *The Astrophysical Journal*, 854:107 (2018).
2. "A New Approach to the Internal Calibration of Reverberation-Mapping Spectra", M. M. Fausnaugh, *Publications of the Astronomical Society of the Pacific*, 129:024007 (2017).
3. "Reverberation Mapping of Optical Emission Lines in Five Active Galaxies", M. M. Fausnaugh et al. (71 authors), *The Astrophysical Journal*, 840:97 (2017).
4. "Continuum Reverberation Mapping of AGN Accretion Disks", Michael M. Fausnaugh et al. (5 authors), *Frontiers in Astronomy and Space Sciences*, 4:55 (2017).
5. "Space Telescope and Optical Reverberation Mapping Project. III. Optical Continuum Emission and Broadband Time Delays in NGC 5548", M. M. Fausnaugh et al. (97 authors), *The Astrophysical Journal*, 821:56 (2016).
6. "The Cepheid distance to the maser-host galaxy NGC 4258: studying systematics with the Large Binocular Telescope", M. M. Fausnaugh et al. (6 authors), *Monthly Notices of the Royal Astronomical Society*, 450:3597 (2015).

Major Author

Contributed major analysis or reduced data

7. "An extreme amplitude, massive heartbeat system in the LMC characterized using ASAS-SN and TESS", T. Jayasinghe et al. (6 authors, including M. M. Fausnaugh), *Monthly Notices of the Royal Astronomical Society*, 489:4705 (2019).
8. "Velocity-resolved Reverberation Mapping of Five Bright Seyfert 1 Galaxies", G. De Rosa et al. (102 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 866:133 (2018).
9. "Space Telescope and Optical Reverberation Mapping Project. V. Optical Spectroscopic Campaign and Emission-line Analysis for NGC 5548", L. Pei et al. (156 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 837:131 (2017).
10. "Swift Monitoring of NGC 4151: Evidence for a Second X-Ray/UV Reprocessing", R. Edelson et al. (44 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 840:41 (2017).
11. "Spitzer Space Telescope Measurements of Dust Reverberation Lags in the Seyfert 1 Galaxy NGC 6418", Billy Vazquez et al. (25 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 801:127 (2015).

Contributing Author

TESS Exoplanets

Authorship acknowledges direct support of the TESS mission

12. "Hot, rocky and warm, puffy super-Earths orbiting TOI-402 (HD 15337)", Xavier Dumusque et al. (33 authors, including M. M. Fausnaugh), *Astronomy & Astrophysics*, 627:22 (2019).
13. "TESS Hunt for Young and Maturing Exoplanets (THYME): A Planet in the 45 Myr Tucana-Horologium Association", Elisabeth R. Newton et al. (52 authors, including M. M. Fausnaugh), *The Astrophysical Journal Letters*, 880:L17 (2019).
14. "A super-Earth and two sub-Neptunes transiting the nearby and quiet M dwarf TOI-270", Maximilian N. Günther et al. (60 authors, including M. M. Fausnaugh),*Nature Astronomy*, page 420 Jul 2019.
15. "WASP-4b Arrived Early for the TESS Mission", L. G. Bouma et al. (24 authors, including M. M. Fausnaugh), *The Astronomical Journal*, 157:217 (2019).
16. "TESS Discovery of an Ultra-short-period Planet around the Nearby M Dwarf LHS 3844", Roland Vanderspek et al. (73 authors, including M. M. Fausnaugh), *The Astrophysical Journal Letters*, 871:L24 (2019).
17. "TESS Discovery of a Transiting Super-Earth in the pi Mensae System", Chelsea X. Huang et al. (66 authors, including M. M. Fausnaugh), *The Astrophysical Journal Letters*, 868:L39 (2018).

TESS: Difference Imaging Pipeline

Contributed analysis

18. "Discovery and Early Evolution of ASASSN-19bt, the First TDE Detected by TESS", Thomas W. -S. Holoien et al. (26 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 883:111 (2019).
19. "ASASSN-18tb: a most unusual Type Ia supernova observed by TESS and SALT", P. J. Vallely et al. (19 authors, including M. M. Fausnaugh), *Monthly Notices of the Royal Astronomical Society*, 487:2372 (2019).

AGN STORM

Co-I status

20. "Space Telescope and Optical Reverberation Mapping Project. X. Understanding the Absorption-line Holiday in NGC 5548", M. Dehghanian et al. (30 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 877:119 (2019).
21. "Space Telescope and Optical Reverberation Mapping Project. VIII. Time Variability of Emission and Absorption in NGC 5548 Based on Modeling the Ultraviolet Spectrum", G. A. Kriss et al. (167 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 881:153 (2019).

22. "Space Telescope and Optical Reverberation Mapping Project. VII. Understanding the Ultraviolet Anomaly in NGC 5548 with X-Ray Spectroscopy", S. Mathur et al. (150 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 846:55 (2017).
23. "Space Telescope and Optical Reverberation Mapping Project.VI. Reverberating Disk Models for NGC 5548", D. Starkey et al. (93 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 835:65 (2017).
24. "Space Telescope and Optical Reverberation Mapping Project. IV. Anomalous Behavior of the Broad Ultraviolet Emission Lines in NGC 5548", M. R. Goad et al. (101 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 824:11 (2016).
25. "Space Telescope and Optical Reverberation Mapping Project. II. Swift and HST Reverberation Mapping of the Accretion Disk of NGC 5548", R. Edelson et al. (50 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 806:129 (2015).
26. "Space Telescope and Optical Reverberation Mapping Project.I. Ultraviolet Observations of the Seyfert 1 Galaxy NGC 5548 with the Cosmic Origins Spectrograph on Hubble Space Telescope", G. De Rosa et al. (50 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 806:128 (2015).

AGN Misc

Co-I status

27. "The first spectroscopic dust reverberation programme on active galactic nuclei: the torus in NGC 5548", H. Landt et al. (19 authors, including M. M. Fausnaugh), *Monthly Notices of the Royal Astronomical Society*, 489:1572 (2019).
28. "Anomalous behaviour of the UV-optical continuum bands in NGC 5548", M. R. Goad et al. (11 authors, including M. M. Fausnaugh), *Monthly Notices of the Royal Astronomical Society*, 486:5362 (2019).
29. "The First Swift Intensive AGN Accretion Disk Reverberation Mapping Survey", R. Edelson et al. (35 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 870:123 (2019).
30. "X-ray/UV/optical variability of NGC 4593 with Swift: reprocessing of X-rays by an extended reprocessor", I. M. McHardy et al. (28 authors, including M. M. Fausnaugh), *Monthly Notices of the Royal Astronomical Society*, 480:2881 (2018).
31. "The Structure of the Broad-line Region in Active Galactic Nuclei. II. Dynamical Modeling of Data From the AGN10 Reverberation Mapping Campaign", C. J. Grier et al. (7 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 849:146 (2017).
32. "Swift/UVOT Grism Monitoring of NGC 5548 in 2013: An Attempt at MgII Reverberation Mapping", E. M. Cackett et al. (7 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 810:86 (2015).
33. "The Typecasting of Active Galactic Nuclei: Mrk 590 no Longer Fits the Role", K. D. Denney et al. (12 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 796:134 (2014).

Spitzer Microlensing Campaign

Contributed observations

34. "Ground-based Parallax Confirmed by Spitzer: Binary Microlensing Event MOA-2015-BLG-020", Tianshu Wang et al. (91 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 845:129 (2017).
35. "OGLE-2015-BLG-1482L: The First Isolated Low-mass Microlens in the Galactic Bulge", S. -J. Chung et al. (42 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 838:154 (2017).
36. "Toward a Galactic Distribution of Planets. I. Methodology and Planet Sensitivities of the 2015 High-cadence Spitzer Microlens Sample", Wei Zhu et al. (40 authors, including M. M. Fausnaugh), *The Astronomical Journal*, 154:210 (2017).
37. "OGLE-2015-BLG-0196: Ground-based Gravitational Microlens Parallax Confirmed by Space-based Observation", C. Han et al. (26 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 834:82 (2017).

38. "The First Simultaneous Microlensing Observations by Two Space Telescopes: Spitzer and Swift Reveal a Brown Dwarf in Event OGLE-2015-BLG-1319", Y. Shvartzvald et al. (99 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 831:183 (2016).
39. "OGLE-2015-BLG-0479LA,B: Binary Gravitational Microlens Characterized by Simultaneous Ground-based and Space-based Observations", C. Han et al. (68 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 828:53 (2016).
40. "The Spitzer Microlensing Program as a Probe for Globular Cluster Planets: Analysis of OGLE-2015-BLG-0448", RadosÅĆaw Poleski et al. (92 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 823:63 (2016).
41. "Spitzer Observations of OGLE-2015-BLG-1212 Reveal a New Path toward Breaking Strong Microlens Degeneracies", V. Bozza et al. (108 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 820:79 (2016).
42. "Spitzer Microlens Measurement of a Massive Remnant in a Well-separated Binary", Y. Shvartzvald et al. (73 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 814:111 (2015).
43. "Spitzer IRAC Photometry for Time Series in Crowded Fields", S. Calchi Novati et al. (27 authors, including M. M. Fausnaugh), *The Astrophysical Journal*, 814:92 (2015).

Miscellaneous

Contributed observations

44. "XMM-Newton observations of the peculiar cataclysmic variable Lanning 386: X-ray evidence for a magnetic primary", M. R. Kennedy et al. (5 authors, including M. M. Fausnaugh), *Monthly Notices of the Royal Astronomical Society*, 466:2202 (2017).
45. "SN 2012au: A Golden Link between Superluminous Supernovae and Their Lower-luminosity Counterparts", Dan Milisavljevic et al. (28 authors, including M. M. Fausnaugh), *The Astrophysical Journal Letters*, 770:L38 (2013).

Unrefereed Publications

46. "Big surprises from small supermassive black holes", Michael Fausnaugh, *Nature Astronomy*, page 694 Jun 2019.
47. American Astronomical Society, AAS Meeting #233, id.202.08, Jan 2019
48. "A Simulated Data Set for the Transiting Exoplanet Survey Satellite", Jon M. Jenkins et al. (18 authors, including M. M. Fausnaugh), *Research Notes of the American Astronomical Society*, 2:47 (2018).
49. American Astronomical Society, AAS Meeting #231, id. 439.12, Jan 2018
50. American Astronomical Society, AAS Meeting #231, id. 439.09, Jan 2018
51. American Astronomical Society, AAS Meeting #231, id. 439.11, Jan 2018
52. The Astronomer's Telegram, No. 9146, Jun 2016
53. The Astronomer's Telegram, No.8356, Dec 2015
54. The Astronomer's Telegram, No.8352, Dec 2015
55. The Astronomer's Telegram, No.6158, May 2014
56. The Astronomer's Telegram, No.6143, May 2014
57. Central Bureau Electronic Telegrams, No. 3549, Jun 2013
58. The Astronomer's Telegram, No.5110, Jun 2013
59. The Astronomer's Telegram, No.5102, Jun 2013
60. American Astronomical Society, AAS Meeting #229, id.414.02, Jan 2017
61. American Astronomical Society, AAS Meeting #225, id.103.02, Jan 2015