

# Thomas Connor

ASTROPHYSICIST · CENTER FOR ASTROPHYSICS | HARVARD & SMITHSONIAN

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## Experience

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### Center for Astrophysics | Harvard & Smithsonian

ASTROPHYSICIST, CHANDRA DIRECTOR'S OFFICE

Cambridge, Massachusetts

Aug. 2022 - Present

### NASA Jet Propulsion Laboratory

NPP FELLOW

Pasadena, California

Oct. 2019 - Aug. 2022

### Observatories of the Carnegie Institution for Science

POSTDOCTORAL FELLOW

Pasadena, California

Sept. 2016 - Sept. 2019

## Education

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### Michigan State University

PHD, ASTRONOMY & ASTROPHYSICS

Advisor: Megan Donahue

Thesis: "Multi-Wavelength Observations of Galaxy Clusters: Population Evolution and Scaling Relations for Intermediate-Redshift Clusters"

MS, ASTRONOMY & ASTROPHYSICS

East Lansing, Michigan

Awarded Aug. 2016

Awarded May 2013

### Case Western Reserve University

BS, ASTRONOMY

Cleveland, Ohio

Awarded May 2011

## Research

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<b>High-Redshift Quasars</b>	Discovery and Analysis of $z > 5$ Quasars
<b>Galaxy Clusters</b>	Characterizing the Evolutionary Pathways of Cluster Members
<b>The Cosmic Web</b>	X-Ray Observations of Diffuse Cosmic Structures
<b>Multiwavelength Synergy</b>	Leveraging Insights Across All Observational Domains

My portfolio consists of 41 refereed publications, including 11 first-author publications, with an h-index of 18. I have been directly awarded over \$600,000, with accepted PI'ed observations with *Chandra*, *XMM-Newton*, the *Hubble Space Telescope*, *NuSTAR*, the Jansky Very Large Array, Gemini, both Magellans, and the Palomar Hale Telescope.

## Observations Awarded

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<i>Chandra</i>	<b>PI: #24700083</b> 708 ks to find jets around high-z quasars	2022
	<b>PI: #23700223</b> 82 ks to observe a high-z quasar and companion	2021
	<b>PI: #23800222</b> 92 ks to observe an AGN-rich cluster at $z > 1$	2021
	<b>Co-I: #22700552</b> 710 ks to survey quasars in the epoch of reionization	2020
	<b>Co-I: #22800459</b> 271 ks to study a high-redshift galaxy clusters	2020
	<b>Co-I: #21700027</b> 120 ks to study an obscured quasar	2019
	<b>Co-I: #20700106</b> 277 ks to study a radio-bright quasar	2018
<i>XMM-Newton</i>	<b>PI: #090286</b> Up to 195 ks to build a sample of double-lensed quasar fluxes	2021
	<b>PI: #086378</b> 186 ks to study a high-z radio-bright quasar	2019
	<b>Co-I: #090420</b> Up to 75 ks to the ICM in high-z clusters with radio emission	2019
	<b>Co-I: #086462</b> Up to 192 ks to study strongly-lensed quasars	2019
	<b>Co-I: #084274</b> 146 ks to study a high-z quasar companion	2019
<i>Hubble Space Telescope</i>	<b>PI: #15198</b> 5 orbits with the Cosmic Origins Spectrograph	2017
	<b>Co-I: #16757</b> 20 Primary and Parallel orbits with WFC3	2021
	<b>Co-I: #16740</b> 9 orbits with WFC	2021
	<b>Co-I: #15308</b> 6 orbits with ACS / WFC3	2017
<i>JWST</i>	<b>Co-I: #02234</b> 17.8 primary hours	Cycle 1
	<b>Co-I: #02078</b> 61.5 primary hours / 29.6 parallel hours	Cycle 1
	<b>Co-I: #01764</b> 65.5 primary hours / 8.6 parallel hours	Cycle 1
	<b>Co-I: #01554</b> 7.8 primary hours	Cycle 1
<i>NuSTAR</i>	<b>PI: #8081</b> 210 ks with 50 ks <i>XMM</i> joint time of a luminous lensed $z > 3$ quasar	2022
	<b>PI: #7291</b> 225 ks targeting a high-z blazar candidate	2021
	<b>Co-I: #7098</b> 75 ks targeting a low-redshift HotDOG	2021
	<b>Co-I: #6236</b> 53 ks targeting candidate subparsec SMBH binaries	2020
Very Large Array	<b>PI: #22A-319</b> 6.00 hours extending the depth of #21B-151	2022
	<b>PI: #21B-151</b> 6.00 hours to search for a radio signature of a high-z X-ray jet	2021
	<b>Co-I: #23A-240</b> 4.80 hours to monitor the most distant-known blazar	2022
	<b>Co-I: #23A-179</b> 11.0 hours and 45 ks of Chandra targeting a high-z quasar	2022
	<b>Co-I: #21B-235</b> 12.50 hours studying $z \sim 1$ galaxy clusters	2021
	<b>Co-I: #21B-087</b> 8.00 hours and 31 ks of XMM targeting a high-z quasar	2021
	<b>Co-I: #21A-307</b> 5.00 hours to investigate the lifetime of a high-z quasar jet	2020
Very Large Baseline Array	<b>Co-I: #23A-293</b> 50.0 hours to resolve high-redshift quasars	2022
	<b>Co-I: #21B-190</b> 12.0 hours to resolve a high-redshift quasar	2021
Magellan Telescopes	<b>PI:</b> 36.5 Nights Awarded	2017-2021
Gemini Observatory	<b>PI / Co-I:</b> 1.0 hours / 9.2 hours	2019-2020
Palomar Hale 200 Inch	<b>PI:</b> 13 Nights Awarded	2020-2022
Irénée du Pont Telescope	<b>PI:</b> 15 Nights Awarded	2017-2020

# Publications

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## PRIMARY (FIRST OR SECOND AUTHOR)

- 1 **Connor et al.** *2022, ApJ, 927, 45*  
“Gaia GRaL: Gaia DR2 Gravitational Lens Systems. VII. XMM-Newton Observations of Lensed Quasars”
- 2 **Connor et al.** *2021b, ApJL, 922, 24*  
“X-Ray Evidence Against the Hypothesis that the Hyper-luminous  $z = 6.3$  Quasar J0100+2802 is Lensed”
- 3 **Connor et al.** *2021a, ApJ, 911, 120*  
“Enhanced X-ray Emission from the Most Radio-Powerful Quasar in the Universe’s First Billion Years”
- 4 **Connor et al.** *2020, ApJ, 900, 189*  
“X-ray Observations of a [C II]-bright,  $z=6.59$  Quasar/Companion System”
- 5 **Connor et al.** *2019d, ApJ, 887, 171*  
“X-ray Observations of a  $z \sim 6.2$  Quasar/Galaxy Merger”
- 6 **Connor et al.** *2019c, ApJL, 884, 20*  
“COS Observations of the Cosmic Web: A Search for the Cooler Components of a Hot, X-ray Identified Filament”
- 7 **Connor et al.** *2019b, ApJ, 878, 66*  
“Assembling a RELIC at Redshift 1: Spectroscopic Observations of Galaxies in the RELICS Cluster SPT-CLJ0615–5746”
- 8 **Connor et al.** *2019a, ApJ, 875, 16*  
“On the Origin of the Scatter in the Red Sequence: An Analysis of Four CLASH Clusters”
- 9 **Connor et al.** *2018, ApJ, 867, 25*  
“Wide-Field Optical Spectroscopy of Abell 133: A Search for Filaments Reported in X-ray Observations”
- 10 **Bañados, Connor et al.** *2018, ApJL, 856, 25*  
“Chandra X-Rays from the Redshift 7.54 Quasar ULAS J1342+0928”
- 11 **Connor et al.** *2017, ApJ, 848, 37*  
“Crowded Field Galaxy Photometry: Precision Colors in the CLASH Clusters”
- 12 **Donahue, Connor et al.** *2017, ApJ, 835, 216*  
“Observations of Ly $\alpha$  and O VI: Signatures of Cooling and Star Formation in a Massive Central Cluster Galaxy”
- 13 **Donahue, Connor et al.** *2015, ApJ, 805, 177*  
“Ultraviolet Morphology and Unobscured UV Star Formation Rates of CLASH Brightest Cluster Galaxies”
- 14 **Connor et al.** *2014, ApJ, 794, 48*  
“Scaling Relations and X-Ray Properties of Moderate-luminosity Galaxy Clusters from  $0.3 < z < 0.6$  with XMM-Newton”

## SECONDARY PAPERS

- 15 **Decker, B. et al. (Connor, T: 4/17)** *2022, ApJ, 936, 71*  
“MaDCoWS XI: Stellar Mass Fractions and Luminosity Functions of MaDCoWS Clusters at  $z \sim 1$ .”
- 16 **Lagattuta, D. J. et al. (Connor, T: 13/21)** *2022, MNRAS, 514, 497*  
“Pilot-WINGS: An extended MUSE view of the structure of Abell 370.”
- 17 **Smirnova-Pinchukova, I. et al. (Connor, T: 9/19)** *2021, A&A, 659, 125*  
“The Close AGN Reference Survey (CARS): No obvious signature of AGN feedback on star formation, but subtle trends.”

- 18 **Rojas-Ruiz, S. et al. (Connor, T: 4/12)** *2021, ApJ, 920, 150*  
 “The Impact of Powerful Jets on the Far-infrared Emission of an Extreme Radio Quasar at  $z \sim 6$ .”
- 19 **Gonzalez, A. et al. (Connor, T: 3/8)** *2021, MNRAS, 507, 963*  
 “Discovery of a Possible Splashback Feature in the Intracluster Light of MACS J1149.5+2223.”
- 20 **Vito, F. et al. (Connor, T: 5/22)** *2021, A&A, 649, 133*  
 “Chandra and Magellan/FIRE follow-up observations of PSO167-13: an X-ray weak QSO at  $z = 6.515$ .”
- 21 **Bañados, E. et al. (Connor, T: 7/20)** *2021, ApJ, 909, 80*  
 “The discovery of a highly accreting, radio-loud quasar at  $z = 6.82$ .”
- 22 **Wang, F. et al. (Connor, T: 9/23)** *2021, ApJL, 907L, 1*  
 “A Luminous Quasar at Redshift 7.642.”
- 23 **Dicker, S.R. et al. (Connor, T: 9/20)** *2020, ApJ, 902, 144*  
 “The Massive and Distant Clusters of WISE Survey. X. Initial Results from a Sunyaev-Zeldovich Effect Study of Massive Galaxy Clusters at  $z > 1$  Using MUSTANG2 on the GBT.”
- 24 **Frisbie, R.L.S. et al. (Connor, T: 4/9)** *2020, ApJ, 899, 159*  
 “Properties of the Hot Ambient Medium of Early-type Galaxies Hosting Powerful Radio Sources.”
- 25 **Holoien, T. et al. (Connor, T: 18/33)** *2020, ApJ, 898, 161*  
 “The Rise and Fall of ASASSN-18pg: Following a TDE from Early to Late Times.”
- 26 **Moravec, E. et al. (Connor, T: 7/21)** *2020, ApJ, 898, 145*  
 “The Massive and Distant Clusters of WISE Survey. IX. High Radio Activity in a Merging Cluster.”
- 27 **Steinhardt, C.L. et al. (Connor, T: 35/95)** *2020, ApJS, 247, 64*  
 “The BUFFALO HST Survey.”
- 28 **Gonzalez, E.J. et al. (Connor, T: 11/14)** *2020, MNRAS, 494, 349*  
 “Setting the scene for BUFFALO: a study of the matter distribution in the HFF galaxy cluster MACS J0416.1-2403 and its parallel field.”
- 29 **Starikova, S. et al (Connor, T: 5/7)** *2020, ApJ, 892, 34*  
 “Stellar-mass Measurements in A133 with Magellan/IMACS.”
- 30 **Chen, P., et al. (Connor, T: 17/24)** *2020, ApJL, 889, L6*  
 “The Most Rapidly-Declining Type I Supernova 2019bkc/ATLAS19dqr.”
- 31 **DeMaio, T., et al. (Connor, T: 7/12)** *2020, MNRAS, 491, 3751*  
 “The growth of brightest cluster galaxies and intracluster light over the past 10 billion years.”
- 32 **Johnson, S.D., et al. (Connor, T: 5/14)** *2019, ApJL, 884, L31*  
 “The Physical Origins of the Identified and Still Missing Components of the Warm-Hot Intergalactic Medium: Insights from Deep Surveys in the Field of Blazar 1ES1553+113.”
- 33 **Holoien, T.W.S., et al. (Connor, T: 19/24)** *2019, ApJ, 883, 111*  
 “Discovery and Early Evolution of ASASSN-19bt, the First TDE Detected by TESS.”
- 34 **Grossova, R., et al. (Connor, T: 11/16)** *2019, MNRAS, 488, 1917*  
 “Powerful AGN jets and unbalanced cooling in the hot atmosphere of IC 4296.”
- 35 **Husemann, B., et al. (Connor, T: 11/18)** *2019, A&A, 627, 53*  
 “The Close AGN Reference Survey (CARS). A massive multi-phase outflow impacting the edge-on galaxy HE1353-1917.”

- 36 **Juráňová, A., et al. (Connor, T: 11/12)** *2019, MNRAS, 484, 2886*  
 “Cooling in the X-ray halo of the rotating, massive early-type galaxy NGC 7049.”
- 37 **Lakhchaura, K., et al. (Connor, T: 7/9)** *2018, MNRAS, 481, 4472*  
 “Thermodynamic properties, multiphase gas and AGN feedback in a large sample of giant ellipticals.”
- 38 **DeMaio, T., et al. (Connor, T: 5/7)** *2018, MNRAS, 474, 3009*  
 “Lost but not forgotten: intracluster light in galaxy groups and clusters.”
- 39 **Morrison, H.L., et al. (Connor, T: 5/13)** *2016, AJ, 151, 7*  
 “Globular and Open Clusters Observed by SDSS/SEGUE: The Giant Stars.”
- 40 **Fogarty, K., et al. (Connor, T: 3/5)** *2015, ApJ, 813, 117*  
 “Star Formation Activity in CLASH Brightest Cluster Galaxies.”
- 41 **Werner, N., et al. (Connor, T: 9/15)** *2014, MNRAS, 439, 2291*  
 “The origin of cold gas in giant elliptical galaxies and its role in fuelling radio-mode AGN feedback”

## Invited Talks

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### Growing the First Supermassive Black Holes

INTERNATIONAL ASTRONOMICAL UNION GENERAL ASSEMBLY 2022

*Busan, Republic of Korea*

*August 2022*

### X-Rays from the Dawn of Time: Understanding the Growth of the First Supermassive Black Holes with X-ray Observations

HARVARD | SMITHSONIAN CENTER FOR ASTROPHYSICS HIGH ENERGY – ASTROPHYSICS COLLOQUIUM

*Virtual*

*March 2022*

### Lights at the Edge of the Universe: Exploring the Quasar Population at the Dawn of Time

HARVARD | SMITHSONIAN CENTER FOR ASTROPHYSICS HIGH ENERGY – ASTROPHYSICS COLLOQUIUM

*Virtual*

*March 2021*

### On the Nature of Galaxy Clusters as Archaeological Records

OBSERVATORIES OF THE CARNEGIE INSTITUTION FOR SCIENCE – COLLOQUIUM

*Virtual*

*February 2021*

### Multiwavelength Insights into the Growth and Evolution of Galaxy Clusters

HARVARD | SMITHSONIAN CENTER FOR ASTROPHYSICS – GALAXY CLUSTERS SEMINAR

*Virtual*

*October 2020*

### Building a Galaxy Cluster

UNIVERSITY OF ALABAMA AT HUNTSVILLE – PHYSICS SEMINAR

*Huntsville, Alabama*

*October 2018*

## Teaching Experience

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### AST 308: Galaxies & Cosmology

GUEST INSTRUCTOR

*Michigan State University*

*2015*

- Lectured and ran in-class assessments while primary teacher was unavailable

### MST@MSU: Astronomy

INSTRUCTOR

*Michigan State University*

*2013*

- Taught a two-week intensive course for middle school students on astronomy and data analysis

### ISP 205L: Visions of the Universe

INSTRUCTOR

*Michigan State University*

*2011-2013*

- Gen Ed astronomy lab course. Responsible for lecturing, overseeing lab time, grading, responding to students, and preparing lab
- Primary instructor for one section per semester (approx. 100 students), and lab assistant for a second

## ASTR 202: Galaxies & the Universe

TEACHING ASSISTANT

- Held office hours, graded homework, and responded to student questions

Case Western Reserve University

2010, 2011

## ASTR 201: Stars & Planets

TEACHING ASSISTANT

Case Western Reserve University

2009, 2010

## ASTR 206: Life in the Universe

TEACHING ASSISTANT

Case Western Reserve University

2010, 2011

## ASTR 204: Einstein's Universe

TEACHING ASSISTANT

Case Western Reserve University

2010

## Honors & Awards

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### FUNDING AND FELLOWSHIPS

2022	<b>Chandra</b> , Surveying for Jets in the First Radio-Loud Quasars	\$222,128
2022	<b>NuSTAR</b> , Breaking the Lens: AGN Cutoff Energy Above Redshift 3	\$99,541
2022	<b>JWST</b> , The JWST-legacy narrow-band survey of H $\alpha$ and [OIII] emitters in the epoch of reionization	\$14,280
2021	<b>Chandra</b> , Do $z > 6$ Quasar Companions Host AGN?	\$59,840
2021	<b>Chandra</b> , An AGN census in a radio-active cluster merger at $z \sim 1$	\$62,200
2021	<b>NuSTAR</b> , The NuSTAR View of the Epoch of Reionization: Hard Energy Insights Into the Drivers of Early Quasar Superluminosity	\$20,000
2019	<b>XMM</b> , Unlocking Super-Eddington Accretion with the Most Distant Radio Source	\$71,514
2019	<b>Chandra</b> , Hunting down the first heavily obscured QSO at $z > 6$	\$5,000
2019	<b>Fellowship</b> , NASA Postdoctoral Program Fellow	\$300,000
2017	<b>HST</b> , UV Observation of a QSO Sightline Intersecting an X-ray Identified Filament of the Cosmic Web	\$61,543
2016	<b>Fellowship</b> , Michigan State University College of Natural Science Dissertation Completion Fellowship	\$6,000
2016	<b>Fellowship</b> , MSU Physics Fellowship	\$1,702

### AWARDS

2022	<b>JPL Postdoc Research Award</b> , Awarded for the best research poster in Astronomy & Astrophysics, one of five lab-wide categories	JPL
2016	<b>Kaplan Award</b> , Awarded for the best presentation of the year at the MSU Physics Grad Organization lunch talks	MSU
2012	<b>Best Graduate TA Award</b> , Awarded for the best graduate teaching assistant of the year in the MSU Department of Physics and Astronomy	MSU
2009	<b>Peter Witt Scholarship</b> , CWRU scholarship honoring students who have shown a dedication to community involvement	CWRU
2009	<b>Case Alumni Association Scholarship</b> , Awarded to CWRU students majoring in STEM based on merit, need, and skills	CWRU

## Outreach Highlights

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### Mt. Wilson STEM Program

ASTRONOMER

*Greater Los Angeles*

*2018 - Present*

One or two-day school visits to Mt. Wilson, possibly including observing on the 60-inch telescope with or without overnight stays. In addition to assisting with observing and answering questions during unstructured times, I also led classes on basic astronomical concepts.

### Carnegie Observatories Open House

STATION LEAD

*Pasadena, California*

*2016 - 2019*

I led the interactive spectroscopy exhibit at the yearly Open House, including event planning, day-of public interaction and volunteer management, and participating in year-to-year event development.

### Astronomy on Tap, Lansing

VOLUNTEER

*Lansing, Michigan*

*2015 - 2016*

I ran social media engagement during events, answered questions from members of the public, and volunteered as a presenter.

## Observing Experience

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### OBSERVING

#### Magellan Baade Telescope

IMACS, IMACS-GISMO, FIRE, MAgE, FOURSTAR

*Las Campanas Observatory, Chile*

*First: 2017*

#### Magellan Clay Telescope

LDSS-3

*Las Campanas Observatory, Chile*

*First: 2018*

#### Hale Telescope

DBSP, TRIPLESPEC, WIRC

*Palomar Observatory, USA*

*First: 2020*

#### SOAR Telescope

GOODMAN, SOI, SPARTAN

*Cerro Tololo Inter-American Observatory, Chile*

*First: 2012*

#### Irénée du Pont Telescope

DIRECT CCD, ECHELLE, WFCCD

*Las Campanas Observatory, Chile*

*First: 2017*

#### Burrell Schmidt Telescope

DIRECT IMAGING

*Kitt Peak National Observatory, USA*

*First: 2011*

### ADDITIONAL DATA REDUCED AND ANALYZED

#### Hubble Space Telescope

ACS/WFC3 IMAGING, COS SPECTRA

*UV / Optical / IR*

#### Chandra X-ray Observatory

ACIS IMAGING AND SPECTROSCOPY

*X-Ray*

#### XMM-Newton

EPIC IMAGING AND SPECTROSCOPY

*X-Ray*

#### Keck I

MOSFIRE IMAGING

*Near-IR*

#### Gemini-North

GMOS IMAGING

*Optical*

## Formal Collaborations

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- HEX-P Probe** Chair of Media and Communications Group  
**MaDCoWS** Photometric selection and analysis of  $z \gtrsim 1$  galaxy clusters  
**Gaia GraL** Machine-learning search for gravitational lenses in *Gaia*  
**BUFFALO** *Hubble*-based exploration of cluster outskirts  
**AXIS Probe** Member of AGN and Galaxies Science Working Groups  
**Athena** Member of Formation and Growth of Earliest SMBH Science Working Group

## Service and Leadership

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- NuSTAR** Member of the Science Operations Center; Quality Assurance reviewer  
**Review Panels** NuSTAR, Chandra, NASA ADAP, other NASA peer review  
**Independent Reviews** Gemini, Hubble, NASA FINNESST  
**Postdoc Representative** Co-Leader of the Carnegie Observatories Postdoc Association for two years  
**AAS** Founding Member of the Early Career Advisory Board  
Chambliss Poster Judge  
**Habitat for Humanity** President, CWRU Habitat for Humanity; Volunteer Coordinator, MSU Habitat for Humanity  
**Physics & Astronomy Club** President (two terms), CWRU Physics and Astronomy Club

## Mentoring

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- Sophia Torrance** CASSI  
SUMMER STUDENT, PRESENTED A POSTER AT 2020 WINTER AAS: "EXPLORING GALAXY QUENCHING MECHANISMS IN GROUPS AND CLUSTERS: A MORPHOLOGICAL ANALYSIS OF RED SEQUENCE GALAXIES" 2019

## Professional Organizations

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- American Astronomical Society** Full Member  
**AAS HEAD** Member

## References

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- Dr. Daniel Stern** NuSTAR Project Scientist  
Senior Research Scientist, Jet Propulsion Laboratory / California Institute of Technology  
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- Dr. John Mulchaey** Crawford H. Greenewalt Chair and Director of The Observatories of the Carnegie Institution for Science  
Past President, Carnegie Institution for Science  
mulchaey@carnegiescience.edu | 626.304.0257
- Prof. Megan Donahue** University Distinguished Professor, Michigan State University  
Past President, American Astronomical Society  
donahu42@msu.edu | 517.884.5618