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Kayhan Gültekin

Assistant Professor of Astronomy
University of Michigan

Education

August 2006	PhD, Astronomy	University of Maryland, College Park, MD, USA Thesis: "Growing IMBHs with Gravitational Waves" Adviser: M. Coleman Miller
December 2001	MS, Astronomy	University of Maryland, College Park, MD, USA
May 1999	BA, Physics *with distinction*	University of Pennsylvania, Philadelphia, PA, USA Thesis: "A Circumstellar Disk Around the High-Mass Protostar L1206A" Adviser: David W. Koerner

Research Interests

Understanding the formation and evolution of supermassive black holes (SMBHs) and their connection to their host galaxies.

Gravitational wave astrophysics.

Observational search for and theoretical predictions of black hole pairs.

Observational studies of SMBHs as a population with respect to their host galaxies.

Observational and analytical modeling of accretion onto the smallest AGNs.

Research Appointments

2016 – Present	Asst. Professor	Dept. of Astronomy, U. Michigan
2009 – 2016	Asst. Research Scientist	Dept. of Astronomy, U. Michigan
2006 – 2009	Postdoctoral Fellow	Dept. of Astronomy, U. Michigan Supervisor: Douglas O. Richstone
2001 – 2006	Grad Research Assistant	Dept. of Astronomy, U. Maryland Supervisor: M. Coleman Miller
2000	Grad Research Assistant	Laboratory for Millimeter-Wave Astronomy, U. Maryland

Research Metrics

Funding	Competitive grants and awards: $1,294,062 (UM funding portion: $1,118,887). See page 2 for a full funding list.
Proposals	PI/Co-I on over 50 telescope and 4 computing proposals. See page 3 for a full list.
Presentations	53 invited colloquia, seminars, and conference talks. See page 10 for a full talks list.
Publications	81 refereed publications (incl. under review), over 5400 citations, h-index = 35. As lead or supervisory author: 25 refereed publications (including under review), over 2100 citations. See page 14 for a full publication list.

Funding

Total awards $1.3 M (UM portion: $1.1 M) and over $742 k at rank (UM: $603 k).

Smithsonian Astrophysical Observatory, 2021, "A Chandra Survey of the Definitive Low-Luminosity AGN Sample," (PI: **Gültekin**), $209,390

Smithsonian Astrophysical Observatory, 2020, "Dual AGN Across Cosmic Time," (Admin PI: **Gültekin**), $82,000

Smithsonian Astrophysical Observatory, 2020, "Quantifying the Rate of Nearby Dual AGN," (Admin PI: **Gültekin**), $167,539 (UM portion: $28,364)

Michigan Space Grant Consortium, 2020, "Time-Domain Signatures of Supermassive Black Hole Binaries," (Admin PI: **Gültekin**), $5,000

Smithsonian Astrophysical Observatory, 2019, "Quantifying the Rate of Nearby Dual AGNs: Archival Sample," (Admin PI: **Gültekin**), $47,500

Smithsonian Astrophysical Observatory, 2018, "Searching for the Recoiling Black Hole in BCG 2261," (PI: **Gültekin**), $68,000

Smithsonian Astrophysical Observatory, 2017, "Quantifying Dual AGN Detectability," (PI: **Gültekin**), $75,000

Smithsonian Astrophysical Observatory, 2017, "Confirming the Low-Mass, Sub-kpc Dual AGN Candidate in SDSS J0914+085," (PI: **Gültekin**), $46,700

National Geographic Society, 2016, "Now you see them, now you don't: the disappearing central engines of changing-look quasars," (Admin PI: **Gültekin**) $2,554

Smithsonian Astrophysical Observatory, 2016, "Testing Models of Circum-Binary-AGN Accretion," (PI: **Gültekin**), $39,200

Space Telescope Science Institute, 2015, "A Direct Test of Galaxy Core Formation in BCG2261," (PI: S. Burke-Spolaor), $55,000 (UM portion: $19,000)

Theodore Dunham, Jr. Grant for Research in Astronomy, 2014, "The fundamental plane of black hole activity," (PI: **Gültekin**), $3,000

Smithsonian Astrophysical Observatory, 2014, "Ultramassive Black Holes: Fundamental Plane and Coronae," (PI: **Gültekin**), $74,816

Space Telescope Science Institute, 2013, "The most massive black hole in a compact galaxy UGC 2698," (Admin PI: **Gültekin**), $15,063

Space Telescope Science Institute, 2012, "The Most Massive Black Holes in Small Galaxies," (Admin PI: **Gültekin**), $86,200

National Science Foundation AAG, 2011, "The Interplay Between Massive Black Holes and their Hosts during Galaxy Mergers," (Orig. PI: M. Volonteri; PI Transfer: **Gültekin**), $221,430

Space Telescope Science Institute, 2011, "Low-Mass Black Holes and CIV in Low-Luminosity AGN," (PI: **Gültekin**), $85,600

Smithsonian Astrophysical Observatory, 2011, "The Radio X-ray BH-Mass Plane for the Smallest Supermassive Black Holes," (Science PI: **Gültekin**), $65,000

Smithsonian Astrophysical Observatory, 2009, "COMBH: Chandra Observations of M-sigma Black Holes," (Science PI: **Gültekin**), $165,000

American Astronomical Society International Travel Grant, 2006, "Leiden confernce on stellar dynamics," (PI: **Gültekin**), $1,000

Jacob K. Goldhaber Travel Grant, 2006, "Leiden confernce on stellar dynamics," (PI: **Gültekin**), $500

Observing Time Allocations

Highlights as PI and supervisor: 1.4 Msec on *Chandra*, 89 hours with NRAO, 14 nights on Magellan, 11 orbits on *HST*. Group members in bold; * marks supervisee.

XMM-Newton Observatory, 2022, "Testing the Binary SMBH Hypothesis for Quasars with Velocity-Offset Broad Lines," (PI: P. Breiding), 4 targets, 52 ksec

Chandra X-ray Observatory, 2021, "A Chandra Survey of the Definitive Low-Luminosity AGN Sample," (PI: **Gültekin**), 22 targets, 395 ksec

Space Telescope Science Institute, JWST, 2021, "Revealing Low Luminosity Active Galactic Nuclei (ReveaLLAGN)," (PI: A. Seth), 31.9 hours

European Southern Observatory, ALMA, 2020, "Black Hole Masses, central parsec gas dynamics, and Event Horizon Detectability in a sample of nearby galaxies," (PI: N. Nagar), 7 targets, 3 hours

Chandra X-ray Observatory, 2020, "Quantifying the Rate of Nearby Duan AGN," (PI: **A. Foord***), 50 targets, 232.25 ksec

European Southern Observatory, ALMA, 2019, "An ACA CO survey: Identifying the best candidates for (approximately less than 2% precision) Black Hole mass measurements," (PI: J. Henao Ocampo), 3 targets, 0.75 hours

Magellan Observatory (UM Time), 2019, "Sub-kpc Dual Nuclei in Nearby AGNs 2," (PI: **A. Foord***), 2 nights

European Southern Observatory VLT/MUSE+AO, 2018, "An accurate supermassive black hole mass for M87: An urgent requirement to correctly interpret upcoming, Event Horizon Telescope images of M87," (PI: N. Nagar), 1 target, 3 hours

National Radio Astronomical Observatory ALMA, 2018, "Resolving the Super Star Clusters in the Nuclear Starburst of NGC 4945," (PI: A. Leroy), 1 target, 2.75 hours

Neil Gehrels Swift Observatory, ToO, 2018, "LMC Transient Source," (PI: **A. Foord***), 1 target, 10 ksec

ATCA, 2018, "A Candidate Massive Black Hole in the Large Magellanic Cloud," (PI: **A. Foord***), 1 target, 12 hours

Chandra X-ray Observatory, 2018, "Searching for the Recoiling Black Hole in BCG2261," (PI: **Gültekin**), 1 target, 100 ksec

Institut de Radio Astronomie Millimetrique, NOEMA, (2016), "Resolving the Molecular Outflow in PG1440 to Test Quasar Feedback Models," (PI: **J. Runnoe***), 1 target, 10 hours

Institut de Radio Astronomie Millimetrique, NOEMA, (2016), "Tracing the Molecular Outflow in IRAS11598-0112 to Test Quasar Feedback Models," (PI: **J. Runnoe***), 1 target, 10 hours

Magellan Observatory (UM Time), 2018, "Sub-kpc Dual Nuclei in Nearby AGNs," (PI: **A. Foord***), 2 nights

European Southern Observatory, ALMA, 2017, "Black Hole Masses, central parsec gas dynamics, and Event Horizon Detectability in a sample of nearby galaxies," (PI: N. Nagar), 2 targets, 0.5 hour

European Southern Observatory, VLT, 2017, "The structure of hidden broad emission lines in the candidate binary supermassive black hole Mrk 533," (PI: **J. Runnoe***), 1 target, 0.5 night

Chandra X-ray Observatory, 2017, "Confirming the Low-Mass, Sub-kpc Dual AGN Candidate in SDSS J0914+085," (PI: **Gültekin**), 1 target, 50 ksec

Chandra X-ray Observatory, 2017, "Testing Models of Circum-Binary-AGN Accretion," (PI: **Gültekin**), 1 target, 40 ksec

Space Telescope Science Institute, HST, 2017, "Increasing Diversity in Galaxies with Black Hole Mass Measurements," (PI: A. Seth), 6 targets, 6 orbits

Neil Gehrels Swift Observatory, (UM time), 2017, "A Massive Black Hole in the Center of the Large Megallanic Cloud," (PI: **A. Foord***), 1 target, 10×10 ksec

National Optical Astronomical Observatory: Gemini Large and Long Porgram, 2016, "Breaking the Envelope of the Relation Between Galaxies and Their Nuclear Black Holes," (PI: J. Walsh), 28 targets, 235 hours

National Radio Astronomical Observatory ALMA, 2016, "Gas-dynamical Mass Measurements of the Black Holes in Red Nugget Relics," (PI: J. Walsh), 3 targets, 1.5 hours

Institut de Radio Astronomie Millimetrique, NOEMA, (2016), "Jet-Feedback in Action: Resolved Molecular Outflow Driven by a Jet in PG 1700+518," (PI: **Gültekin**), 1 target,

Magellan Observatory (UM Time), 2016, "Doubling Down on Type-1 Quasar Feedback with Integral Field Spectroscopy, part 2," (PI: **Gültekin**), 2.75 nights

Magellan Observatory (UM Time), 2016, "What Causes the Changing Looks of Changing-Look Quasars?," (PI: **Gültekin**), 2 nights

Hubble Space Telescope, 2015, "Testing for a Recoiling Supermassive Black Hole in the Giant Core of BCG 2261," (PI: S. Burke Spolaor), 1 target, 8 orbits

Magellan Observatory (UM Time), 2018, "Doubling Down on Type-1 Quasar Feedback with Integral Field Spectroscopy," (PI: **Gültekin**), 2 nights

National Radio Astronomical Observatory EVLA, 2014, "Probing the Jet Turnover Frequency Dependence on Mass and Mass Accretion Rate," (PI: A. King), 16 targets, 16 hours

Chandra X-ray Observatory, 2014, "Ultramassive Black Holes: Fundamental Plane and Coronae," (PI: **Gültekin**), 7 targets, 116 ksec

National Radio Astronomical Observatory EVLA, 2014, "Ultramassive Black Holes: Fundamental Plane and Coronae (joint with above)," (PI: **Gültekin**), 7 targets, 21 hours

National Radio Astronomical Observatory EVLA, 2014, "Confirming the Low-Mass, Sub-kpc Dual AGN Candidate in SDSS J091449.05+085321.1," (PI: **Gültekin**), 1 targets, 8 hours

National Radio Astronomical Observatory EVLA, 2014, "Very Small AGN and the Fundamental Plane of Black Hole Accretion," (PI: **Gültekin**), 8 targets, 25.5 hours

National Radio Astronomical Observatory EVLA, 2014, "A Direct Test of Galaxy Core Formation in BCG2261," (PI: Spolaor), 1 targets, 16.5 hours

National Radio Astronomical Observatory EVLA, 2014, "Ultramassive Black Holes on the Fundamental Plane of Black Hole Accretion," (PI: **Gültekin**), 5 targets, 15 hours

Hubble Space Telescope, 2013, "The most massive black hole in a compact galaxy UGC 2698," (PI: van den Bosch), 1 target, 1 orbit

Hubble Space Telescope, 2012, "The Most Massive Black Holes in Small Galaxies," (PI: van den Bosch), 16 targets, 16 orbits

MDM Observatory (UM time), 2011, "Low-Mass Black Holes and CIV in Low-Luminosity AGN," (PI: **Gültekin**), 6 nights

Hubble Space Telescope, 2011, "Low-Mass Black Holes and CIV in Low-Luminosity AGN," (PI: **Gültekin**), 5 targets, 11 orbits

Chandra X-ray Observatory, 2011, "The Radio–X-ray–BH-Mass Plane for the Smallest Supermassive Black Holes," (PI: **Gültekin**), 6 targets, 101 ksec

National Radio Astronomical Observatory EVLA, 2011, "The Radio–X-ray–BH-Mass Plane for the Smallest Supermassive Black Holes (joint with above)," (PI: **Gültekin**), 6 targets, 7.5 hours

Neil Gehrels Swift Observatory, 2011, "Swift Galactic Plane Survey," (PI: M. Reynolds), 1.4 Msec

National Optical Astronomical Observatory: Gemini, 2011, "Probing the Envelope of the Black Hole Mass–Galaxy Dispersion Relation," (PI: D. Richstone), 2 targets, 12 hours

Magellan Observatory (UM Time), 2010, "MaSHiZLE: Magellan Survey of High-z Lymanα Emitters," (PI: **Gültekin**), 2 nights

Magellan Observatory (UM Time), 2010, "The Gateway to the Biggest Nearby Black Holes," (PI: **Gültekin**), 2 nights

National Radio Astronomical Observatory EVLA, 2010, "Do Accretion-Ejection Lags Scale with Black Hole Mass?," (PI: A. King), 16 targets, 8 hours

Chandra X-ray Observatory, 2009, "COMBH: Chandra Observations of M-sigma Black Holes," (PI: **Gültekin**), 12 targets, 360 ksec

National Radio Astronomical Observatory EVLA, 2009, "COMBH: Chandra Observations of M-sigma Black Holes (joint with above)," (PI: **Gültekin**), 12 targets, 12 hours

National Optical Astronomical Observatory: Gemini, 2007, "The Massive Black Hole in M87," (PI: D. Richstone), 1 target, 10 hours

High-Performance Computing Time Allocations

NSF XSEDE, 2022, "NANOGrav: Gravitational Wave Detection with Pulsar Timing Arrays," PHY210007, PSC Bridges-2, (PI: S. Vigeland), Allocation: 18,140,000 core-hours.

NSF XSEDE, 2022, "NANOGrav: Gravitational Wave Detection with Pulsar Timing Arrays," PHY210007, PSC Bridges-2, (PI: C. Witt), Startup Allocation: 50,000 SU.

NSF XSEDE, 2019, "Scale tests of Binary Supermassive Black Holes," AST190061, TACC Dell/Intel Knights Landing, Skylake System (Stampede2) (PI: **Gültekin**), Allocation: 1,600 SBU.

NASA High-End Computing Program, 2019, "Quantifying Dual AGN Detectability," HEC-SMD-19-2554, Pleiades, (PI: **Gültekin**), Allocation: 34,769 SBU.

Mentoring Experience

Postdocs

Jessie C. Runnoe (2016–2020, now tenure-track faculty at Vanderbilt University) Multi-wavelength studies of quasar outflows.

PhD Students

T. Korbin Waters (pre-candidate, 2022–expected graduation 2027) "A stellar dynamical black hole mass measurement of NGC 3258."

CJ Harris (candidate, 2021–expected graduation 2026) "Connecting galaxy cores to black hole binary populations."

Cayenne Matt (candidate, 2021–expected graduation 2026) "The impact of black Hole scaling relation assumptions on gravitational wave background predictions."

Kevin Whitley (candidate, 2018–expected graduation Fall 2023, co-supervised with Prof. Mateusz Ruszkowski) "Time-domain signatures of supermassive black hole binaries."

Adi Foord (2017–2020, graduated, now Porat Fellow at Stanford University, starting tenure-track position at University of Maryland, Baltimore County in Fall 2023) "Discovering the Missing Population of AGN Pairs with *Chandra*."

PhD Dissertation Committees

Department of Astronomy

Mayura Balakrishnan (exp. graduation 2025; chair: Lía Corrales) X-ray spectroscopy of Sgr A*.

Renee Ludlam (graduated 2019; chair: Jon Miller) "A Hard Look at Accretion Around Neutron Stars."

Bryan Terrazas (graduated 2019; chair: Eric Bell) "The Impact of Supermassive Black Hole Feedback on Star Formation in Galaxies."

University of Michigan Cognate

Gino Knodel (graudated 2016; Physics; chair: James Liu) "Lifshitz Spacetime as a Window into Condensed Matter Physics."

Pedro Lisbao Oliveira De Carvalho (graduated 2016; Physics; chair: Finn Larsen) "Quantum Corrections To Gravity: Polishing The Window Into The Microstates."

Brian McPeak (graudated 2020; Physics; chair: James Liu) "Holography, Supergravity, and the Weak Gravity Conjecture."

Alyssa Garcia (graduated 2023; Physics; chair: Marcelle Soares-Santos) "Searches for the Electromagnetic Signatures of Merging Binary Neutron Stars and Black Holes in the Third Observing Campaign of the Dark Energy Survey Gravitational Wave Search and Discovery Program."

External PhD Committees

Benjamin Coughenour (graduated 2020, Department of Physics, Wayne State University; chair: Edward Cackett) "Reflection and Reverberation in Neutron Star Low-Mass X-ray Binaries."

Juan David Osorno Quiceno (defending Oct. 2023, Department of Physics and Math, University of Concepción; chair: Neil Nagar) "Cinemática y Dinámica de Gas Ionizado en el Núcleo de la Galaxia M87."

Undergraduate Students

Keith Campbell (2016–2017) Astro 399 indep. study student "*Swift* UV monitoring of Mrk 231."

Brandon Dix (Fall 2020) Astro 399 indep. study student "Radio analysis of low-mass black hole."

Greg Fehmer (2021–2022) Astro 399 independent study student "Intermediate-mass black holes and the fundamental plane of black hole accretion," senior thesis (Physics department) "Radio Observations of Ultra-Massive Black Holes."

Andrew Gardner (Fall 2020) Astro 399 indep. study student "Radio analysis of low-mass black hole."

Nichole Gray (2020–2021) Astro 399 independent study student "Intermediate-mass black holes and the fundamental plane of black hole accretion."

Erica Hammerstein (2017–graduated 2018, now PhD candidate at Department of Astronomy, U. Maryland, College Park) undergraduate research assistant, Astro 399 independent study student "Probing the Jet Turnover Frequency Dependence on Black Hole Mass and Mass Accretion Rate."

Tianchi Huang (2021–2022) Astro 399 independent study student "Intermediate-mass black holes and the fundamental plane of black hole accretion," senior thesis "X-ray Spectral Analysis of 7 AGN targets with Ultra-massive Black Holes."

Matthew Sparkman (2020–2021) Astro 399 independent study student "Intermediate-mass black holes and the fundamental plane of black hole accretion."

High school students

Onur Yeşioğlu (2020–2021) research internship "*Swift* monitoring of AGN binary candidates."

Major Collaborations

LISA (*Laser Interferometer Space Antenna*) Consortium, *member*, 2020–Present.
NANOGrav (North American Nanohertz Observ. for Gravitational Waves), *full member*, 2019–Present, *Astrophysics Working Group Co-chair* 2023–Present.
ReveaLLAGN (Revealing Low-Luminosity Active Galactic Nuclei), *member*, 2017–Present.
Gemini/NIFS LLP, *chair modeling group*, 2016–Present.
Nukers, *member*, 2006–Present.

Teaching Experience

Instructor of Record at U. Michigan

Astro 206 Black Holes: The Triumph of Gravity, Fall 2023.
Astro 101 Introductory Astronomy: The Solar System and the Search for a New Earth, Winter 2023.
Astro 201 Introduction to Astrophysics, Fall 2022.
Astro 101 Introductory Astronomy: The Solar System and the Search for a New Earth, Winter 2022.
Astro 532 The High Energy Universe, Fall 2021.
Astro 201 Introduction to Astrophysics, Winter 2021 (virtual).
Astro 201 Introduction to Astrophysics, Fall 2020 (virtual).
Astro 201 Introduction to Astrophysics, Fall 2019.
Astro 201 Introduction to Astrophysics, Winter 2019.
Astro 102 Introductory Astronomy: Stars, Galaxies, and the Universe, Fall 2018.
Astro 101 Introductory Astronomy: The Solar System and the Search for a New Earth, Winter 2018.
Astro 201 Introduction to Astrophysics, Fall 2017.
Astro 102 Introductory Astronomy: Stars, Galaxies, and the Universe, Winter 2017.
Astro 102 Introductory Astronomy: Stars, Galaxies, and the Universe, Winter 2016.

Other Teaching

Guest lecturer at University of Michigan for Astro 101 (Introductory Astronomy: The Solar System and the Search for a New Earth); Astro 201 (Introduction to Astrophysics); Astro 115 (Astrobiology); Astro 404 (Galaxies and the Universe); Astro 534 (Cosmology).

Guest lecturer at University of Maryland, College Park for ASTR615 (Graduate Computational Astrophysics); ASTR695 (Graduate Introduction to Research).

Graduate instructor at University of Maryland, College Park for ASTR111 (Observational Astronomy Laboratory) Fall 2000, Spring 2001.

Teaching Assistant at University of Maryland, College Park for ASTR100 (Introduction to Astronomy) Fall 1999, Spring 2001.

Professional Service

Departmental Service

SEA-Change Committee *Chair* (2023–2024)
DEI Committee *Chair* (2021–2023) Faculty representative (2018–2019, 2020–2021)
Prelim Committee *Chair* (2022–2024) member (2021–2022)
Science library Astronomy department liaison (2015–2024)
Grad Admissions Committee member (2015–2017, 2020–2021)
IRAM/NOEMA Department Proposal Committee *Chair* (2016–2019)
Reviewer of research scientist (2018)
NEXTProf Science Workshop Astronomy Department representative (2015–2017)
Colloquium Co-organizer (2008-2009, 2010–2012)
Extreme Astrophysics seminar seiries co-organizer (2009–2010)

Accretion Research Topics discussion organizer (2007)

University Service

LSA Faculty Call Out Astronomy Department Representative (2017)

International Service

Analyst for NASA, ESA and NSF Programs

NASA *LISA* Study Team analyst (2018–Present)
Advanced X-ray Imaging Satellite (AXIS) NASA Probe Mission Concept AGN Science Working Group member (2021–Present)
US Extremely Large Telescope (ELT) Program science program analysis (2017–2019)

Conferences and Meetings Organized

Compact Objects in Michigan VI *Chair* of SOC and LOC analyst, Ann Arbor, MI (2018)
Black Holes by the Black Sea *Chair* of SOC, Istanbul, Turkey (2012)
Single and Double Black Holes SOC, Ann Arbor, MI (2011)

Review Service

Funding Reviews

National Science Foundation AAG Panelist (*twice*)
NASA Postdoctoral Program reviewer (*once*)
The National Fund for Scientific and Technological Development (FONDECYT) (*three times*)

Telescope Allocation Reviews

Chandra X-ray Observatory Panelist (*twice*) Panel *Chair* (*once*)
Hubble Space Telescope Panel *Deputy Chair* (*once*)
Magellan Observatory University of Michigan allocation panelist (*three* times)
MDM Observatory University of Michigan allocation panelist (*three* times)
Neil Gehrels Swift Observatory University of Michigan allocation panelist (*twice*)

Journal Refereeing Service

AAS Journals *The Astrophysical Journal*, *The Astrophysical Journal Letters*
Monthly Notices of the Royal Astronomical Society
Astronomy & Astrophysics
Nature
Science

Diversity Equity & Inclusion Service

AAAS SEA-Change Department lead in AAAS SEA-Change Department Award application
AIP TEAM-UP Department lead on assessment and analysis
Astro MENA Head of department Middle Eastern and North African affinity group

Public Outreach

Public Talks and Lectures

Keynote Speaker, Sigma Xi, The Scientific Research Honor Society. "Seeing and Hearing Black Holes" 24 April 2023, Ann Arbor, MI.

Science Cafe, "What is a black hole, anyway?" 26 Feb. 2014, Conor O'Neill's Traditional Irish Pub, Ann Arbor, MI.

Public Writings and Creative Works

3D planetarium visualization for dispelling misconceptions about black holes, 2015.
Permanent exhibit at UM Natural History Museum (former location) on black holes, 2014.
Contributing author Astronomy magazine's "Ask Astro" column, September 2013 issue.
Video walk-through of MDM observatory for third-grade class, 2013.

Activities

Science Olympiad Coach for Bryant-Pattengill elementary school, Ann Arbor, MI, 2013–2015.
Telescope operator, facilitator, and educational reference for department open houses and special events, College Park, MD, 1999–2004.

Research Talks

Over 40 invited colloquia and seminars, twice conference panelist, 8 invited conference talks.

Invited Colloquia and Seminars

"Supermassive Black Holes and the Nanohertz Gravitational Wave Background." Wayne State University Physics and Astronomy Colloquium, Detroit, MI, 30 November 2023.

"The Nanohertz Gravitational Wave Background and Supermassive Black Holes." Joint University of Arizona & NOIRLab Colloquium, Tucson, AZ, 29 September 2023.

"Measuring Masses and Gravitational Waves of Supermassive Black Holes." High-Energy Physics / Astro seminar, University of Michigan Physics, Astrophysics seminar, 21 November 2022.

"Black Holes are awesome or something." Texas A&M University Physics and Astronomy, Astrophysics seminar, *teleconference* 25 October 2021.

"Pairs of Supermassive Black Holes," Rochester Institute of Technology, School of Physics and Astronomy Colloquium, *teleconference* 1 February 2021.

"How to measure black hole masses," NANOGrav AWG, *teleconference* 4 December 2020.

"A2261 Mini-presentation," NANOGrav AWG, 6 November 2020.

University of Florida Physics Department Astrophysics Seminar, *teleconference* 21 October 2020.

"Supermassive Black Hole Outflows and Pairs," University of California, Irvine Physics Department Astrophysics Seminar, *teleconference* 19 May 2020.

"Supermassive Black Hole Outflows and Pairs," University of Colorado Department of Astrophysical and Planetary Sciences Colloquium, Boulder, CO, 17 February 2020.

"2 > 1: SMBH Pairs," Univ. of Toledo Physics Colloquium, Toledo, OH, 30 January 2020.

"Supermassive Black Hole Outflows and Pairs," Montana State University Physics Colloquium, Bozeman, MT, 24 January 2020.

"Supermassive Black Hole Outflows and Pairs," University of Illinois Astronomy Colloquium, Urbana, Illinois, 9 April 2019.

"2 > 1: the Search for Supermassive Black Hole Pairs," University of Memphis Physics Colloquium, Memphis, Tennessee, 22 March 2019.

"Looking for Supermassive Black Hole Binaries," Stanford University Astrophysics Colloquium, Palo Alto, California, 1 March 2018.

"Supermassive Black Holes," UNLV Dept of Physics and Astronomy Colloquium, Las Vegas, Nevada, 24 March 2015.

"The ABC's of Supermassive Black Holes: Accretion, Binaries, and Coëvolution," Cal State Univ Northridge, Dept of Physics Colloquium, Los Angeles, California, 24 February 2015.

"The Stellar Dynamical Mass of M87 and Friends," Event Horizon Telescope 2014, Perimeter Institute, Waterloo, Ontario, Canada, 11 November 2014.

"The ABC's of Supermassive Black Holes: Accretion, Binaries, and Coëvolution," NRAO AOC Colloquium, Socorro, New Mexico, 26 September 2014.

"The ABC's of Supermassive Black Holes: Accretion, Binaries, and Coëvolution," UNLV, Las Vegas, Nevada, 19 February 2014.

"Status of the Black Hole Scaling Relationships," invited review talk at SnowPAC 2013; Black Hole Fingerprints: Dynamics, Disruptions, and Demographics, Little Cottonwood Canyon, Utah, 17 March 2013.

"Black Holes and Their Evolution: Combining Multiwavelength Observations and Theory," invited astrophysics seminar, Notre Dame University, South Bend, Indiana, 15 January 2013.

"Black Holes and Their Evolution: Combining Multiwavelength Observations and Theory," Michigan State University, East Lansing, 10 October 2012.

"Black Holes and Their Evolution: Combining Multiwavelength Observations and Theory," Georgia State University, Atlanta, 6 September 2012.

"Black Hole and Galaxy Coevolution: Observations and Simulations," Indiana University, Bloomington, 28 February 2012.

"Black Hole Scaling Relations: Observations and Theory," Wayne State University Nuclear-Astro-Particle Seminar, Detroit, MI, 15 February 2012.

"Using a new scaling relation to test old Black Hole Scaling Relations," Penn State Astronomy Department colloquium, State College, 1 February 2012.

"Black Hole Scaling Relations: Smoking Gun or Red Herring?," University of Maryland Astronomy Department colloquium, College Park, 8 November 2011.

"How to Measure Black Hole Masses with X-ray and Radio (and learn everything you need to know about galaxy evolution)," University of Virginia Astronomy and NRAO joint colloquium, Charlottesville, 13 October 2011.

"Black Hole Scaling Relations," Univ. of Texas Astronomy Dept. colloquium, Austin, 20 September 2011.

"Black Hole Scaling Relations," Steward Observatory and NOAO joint colloquium, University of Arizona, Tucson, 8 September 2011.

"Implications for SMBH–Galaxy Co-Evolution due to New Scaling Relations," Institute of Theoretical Astrophysics Colloquium, Heidelberg, Germany, 15 September 2010.

"New Scaling Relations and their Implications for SMBH–Galaxy Co-Evolution," Max Planck Institute for Astronomy special seminar, Heidelberg, Germany, 14 September 2010.

"The IMBH–SMBH Connection," Intermediate-Mass Black Holes: from First Light to Galactic Nuclei, UC Irvine Center for Cosmology, Irvine, CA, 2 April 2009.

"Scatting about M–σ," Astronomy Department Colloquium, University of Michigan, Ann Arbor, MI, 4 December 2008.

"Growing Intermediate-Mass Black Holes with Gravitational Waves," Extra-Galactic Astronomy Seminar, Austin, TX, 21 September 2006.

"Growing Black Holes in Globular Clusters," Galactic Nuclei Workshop, Leiden, The Netherlands, 27 July 2006.

"Growth of Intermediate-Mass Black Holes in Globular Clusters and their Gravitational Waves," Space Sciences Seminar, George Mason, Fairfax, VA, 14 September 2005.

"Making IMBHs and Gravitational Waves in Globular Clusters," Astronomy Seminar, Caltech, Pasadena, CA, 6 December 2004.

"The Role of Three-Body Encounters in IMBH Formation," Center for Astrophysical Sciences Seminar, Johns Hopkins University, Baltimore, MD, 16 November 2004.

"From Newtonian Dynamics to Gravitational Waves," University of Pennsylvania Astrophysics Seminar, Philadelphia, PA, 20 October 2004.

"Growing IMBHs in Globular Clusters," University of Virginia and NRAO Seminar, Charlottesville, VA, 19 October 2004.

"The Role of Three-Body Encounters in IMBH Formation and their Gravitational Waves," LHEA Seminar, GSFC, Greenbelt, MD, 15 October 2004.

"Close Encounters of the Three-Body Kind," Penn State Seminar, State College, PA, 3 March 2003.

Conference Panels

Panelist, NANOGrav General Meeting, *teleconference* 30 October 2020.

Event Horizon Telescope 2014, Perimeter Institute, Waterloo, Ontario, Canada, 11 November 2014.

Invited Conference Talks

"Pairs and Populations of Supermassive Black Holes Across Time and Mass," eXtreme Black Holes, Aspen, CO 10 March 2023.

"Electromagnetic and Gravitational Wave Constraints of Black Hole Evolution," Astrophysical Black Holes, University of Miami Physics Conference, *presented virtually*, 16 December 2022.

"Extremely big black holes across cosmic time," Magellan Telescope Community Science Meeting. 9 September 2022.

"Black Hole masses Past, Present, and Future," Supermassive Black Holes conference by Universidad de Concepción, *teleconference* 7 December 2020.

"Electromagnetic Observability of SMBH Pairs," Sexten Center for Astrophysics conference Getting Ready to Descend the Slippery Slope of Multimessenger Cosmological Black Holes, invited talk, Sesto, Italy, 12 February 2020.

"The Black Holes in Massive Galaxies," Massive Galaxies: Aspen Winter Conference 2014, Aspen, Colorado, 7 February 2014.

"Probing the black-hole–galaxy scaling relations: present and past," invited talk at KITP Conference: Massive Black Holes: Birth, Growth, and Impact, KITP, Santa Barbara, California, 8 August 2013.

"Black Hole Scaling Relations and their Possible Evolution," Single and Double Black Holes Workshop, Michigan Center for Theoretical Physics, Ann Arbor, MI, 22 August 2011.

"The Mass of Supermassive Black Holes: New Scaling Relations," Matter and Electromagnetic Fields in Strong Gravity, University of Maryland, College Park, MD, 24 August 2009.

Selected Contributed Conference Talks

"BH scaling relations," NANOGrav fall meeting October 2022.

"What we do and do not know about the local scaling relations," informal seminar at KITP Program: A Universe of Black Holes, KITP Santa Barbara, California, 6 September 2013.

"New Scaling Relations: Implications for SMBH–Galaxy Co-Evolution," Evolution of Galaxies, their Central Black Holes, and their Large-Scale Environment, Astrophysical Institute Potsdam, Germany, 21 September 2010.

"Determination of the intrinsic scatter in the M–σ and M–L relations," IAU Symposium 267, Evolution of Galaxies and Central Black Holes: Feeding and Feedback, Rio de Janeiro, Brazil, 12 August 2009.

Publications

> 80 refereed publications, > 5400 citations, h-index = 35, g-index = 74. As first author or supervisor: 25 refd. pubs, > 2100 citations. Group members in bold; * marks supervisee. ORCID: 0000-0002-1146-0198.

Refereed Publications

81. **CJ. Harris*** & **K. Gültekin** "Revealing the Massive Binary Black Hole Population from Core Galaxy Properties." *Mon. Not. R. Astron. Soc.*, **528**, 1, (2024).
80. **K. Whitley*** , A. Kuznetsova, **K. Gültekin**, & M. Ruszkowski "Shock-Driven Periodic Variability in a Low-Mass-Ratio Supermassive Black Hole Binary." *Mon. Not. R. Astron. Soc.*, **527**, 6569 (2024).
79. B. Sandoval et al. "Searching for the Highest-z Dual AGN in the Deepest Chandra Surveys." *Astrophys. J.*, under review, arXiv:2312.02311 (2023).
78. B. Bécsy et al. "How to Detect an Astrophysical Nanohertz Gravitational-Wave Background." *Astrophys. J.*, **959**, 9 (2023).
77. J. H. Cohn, et al. "ALMA gas-dynamical mass measurement of the supermassive black hole in the red nugget relic galaxy PGC 11179," *Astrophys. J.*, **958**, 186 (2023).
76. J. Osorno, N. Nagar, T. Richtler, P. Humire, K. Gebhardt, & **K. Gültekin** "Revisiting the black hole mass of M87* using VLT/MUSE Adaptive Optics Integral Field Unit data I: Ionized gas kinematics." *Astron. & Astrophys.*, **679A**, 37 (2023).
75. G. Agazie et al. "The NANOGrav 15-year Data Set: Search for Transverse Polarization Modes in the Gravitational-Wave Background." *Astrophys. J.*, under review, arXiv:2310.12138 (2023g).
74. G. Agazie et al. "The NANOGrav 15-year Data Set: Search for Anisotropy in the Gravitational-wave Background." *Astrophys. J. Lett.*, **956**, L3 (2023g).
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72. The International Pulsar Timing Array Collaboration et al. "Comparing recent PTA results on the nanohertz stochastic gravitational wave background." *Astrophys. J.*, under review, arXiv:2309.00693 (2023b).
71. **C. Matt*** , **K. Gültekin**, & J. Simon "The Impact of Black Hole Scaling Relation Assumptions on Gravitational Wave Background Predictions." *Mon. Not. R. Astron. Soc.*, **524**, 4403 (2023).
70. G. Agazie et al. "The NANOGrav 15 yr Data Set: Constraints on Supermassive Black Hole Binaries from the Gravitational-wave Background." *Astrophys. J. Lett.*, **952**, L37 (2023d).
69. G. Agazie et al. "The NANOGrav 12.5-year Data Set: Search for Gravitational Wave Memory." *Astrophys. J.*, under review, arXiv:2307.13797 (2023f).
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67. G. Agazie et al. "The NANOGrav 15-year Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries." *Astrophys. J. Lett.*, **951**, L50 (2023e).
66. Z. Arzoumanian et al. "The NANOGrav 12.5-year Data Set: Bayesian Limits on Gravitational Waves from Individual Supermassive Black Hole Binaries." *Astrophys. J. Lett.*, **951**, L28 (2023b).
65. A. Afzal et al. "The NANOGrav 15-year Data Set: Search for Signals from New Physics." *Astrophys. J. Lett.*, **951**, L11 (2023).

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59. **K. Gültekin** et al. "Intermediate-mass black holes and the Fundamental Plane of black hole accretion." *Mon. Not. R. Astron. Soc.*, **516**, 6123 (2022).
58. G. R. Hauschild Roier et al. "Gas inflows in the polar ring of NGC 4111: the birth of an AGN." *Mon. Not. R. Astron. Soc.*, **512**, 2556 (2022).
57. A. Foord, X. Liu, **K. Gültekin**, et al. "Investigating the Accretion Nature of Binary Supermassive Black Hole Candidate SDSS J025214.67-002813.7," *Astrophys. J.*, **927**, 3 (2022).
56. H. Cho, et al. "Hα Reverberation Mapping of the Intermediate-mass Active Galactic Nucleus in NGC 4395," *Astrophys. J.*, **921**, 98 (2021).
55. J. H. Cohn, et al. "An ALMA Gas-dynamical Mass Measurement of the Supermassive Black Hole in the Local Compact Galaxy UGC 2698," *Astrophys. J.*, **919**, 77 (2021).
54. **J. C. Runnoe*** , **K. Gültekin**, D. Rupke., & A. López-Sepulcre "Properties of cold molecular gas in four type-1 active galaxies hosting outflows." *Mon. Not. R. Astron. Soc.*, **505**, 6017 (2021).
53. **A. Foord*** , **K. Gültekin**, et al. "AGN Triality of Triple Mergers: Multiwavelength Classifications," *Astrophys. J.*, **907**, 72 (2021).
52. **A. Foord*** , **K. Gültekin**, et al. "AGN Triality of Triple Mergers: Detection of Faint X-Ray Point Sources," *Astrophys. J.*, **907**, 71 (2021).
51. **K. Gültekin** et al. "Chandra Observations of Abell 2261 Brightest Cluster Galaxy, a Candidate Host to a Recoiling Black Hole" *Astrophys. J.*, **906**, 48, (2021).
50. M. Pahari et al. "Evidence for Variability Time-Scale-Dependent UV/X-ray Delay in Seyfert 1 AGN NGC 7469," *Mon. Not. R. Astron. Soc.*, **494**, 4057 (2020).
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48. **A. Foord*** , **K. Gültekin**, et al. "A Bayesian Analysis of SDSS J0914+0853, a Low-Mass Dual AGN Candidate." *Astrophys. J.*, **877**, 17 (2019).
47. **E. K. Hammerstein*** , **K. Gültekin**, & A. L. King "Probing the Jet Turnover Frequency Dependence on Black Hole Mass and Mass Accretion Rate." *Astrophys. J.*, **875**, 82 (2019).
46. **K. Gültekin** et al. "The Fundamental Plane of Black Hole Accretion and its Use as a Black-Hole-Mass Estimator." *Astrophys. J.*, **871**, 80, (2019).
45. **J. C. Runnoe*** , **K. Gültekin**, & D. S. N. Rupke. "Does the Compact Radio Jet in PG 1700+518 Drive a Molecular Outflow?" *Astrophys. J.*, **852**, 8 (2017).
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33. E. M. Cackett, **K. Gültekin**, M. C. Bentz, M. M. Fausnaugh, B. M. Peterson, & J. Troyer. "Swift/UVOT grism monitoring of NGC 5548 in 2013: an attempt at MgII reverberation mapping," *Astrophys. J.*, **810**, 86 (2015).

32. J. L. Walsh, R. C. E. van den Bosch, K. Gebhardt, A. Yıldırım, **K. Gültekin**, B. Husemann, & D. O. Richstone. "The Black Hole in the Compact, High-Dispersion Galaxy NGC 1271." *Astrophys. J.*, **808**, 183 (2015).

31. R. C. E. van den Bosch, K. Gebhardt, **K. Gültekin**, A. Yıldırım, & J. L. Walsh. "Hunting for Supermassive Black Holes in Nearby Galaxies With the Hobby–Eberly Telescope." *Astrophys. J. Suppl.*, **218**, 10 (2015).

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29. A. L. King et al. "The Rate of Gas Accretion onto Black Holes Drives Jet Velocity." *Astrophys. J. Lett.*, **799**, L8 (2015).

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26. Degenaar, N. et al. "Multi-wavelength Coverage of State Transitions in the New Black Hole X-Ray Binary Swift J1910.2−0546." *Astrophys. J.*, **784**, 122 (2014).

25. **K. Gültekin**, K. Gebhardt, J. Kormendy, T. R. Lauer, R. Bender, S. Tremaine, & D. O. Richstone. "The Black Hole Mass and Stellar Ring in NGC 3706." *Astrophys. J.*, **781**, 112 (2014).

24. A. L. King, J. M. Miller, M. T. Reynolds, **K. Gültekin**, E. Gallo, & D. Maitra. "A Distinctive Disk-Jet Coupling in the Lowest-mass Seyfert, NGC 4395." *Astrophys. J. Lett.*, **774**, 25 (2013).

23. A. L. King, J. M. Miller, **K. Gültekin**, D. J. Walton, A. C. Fabian, C. S. Reynolds, & K. Nandra. "What is on Tap? The Role of Spin in Compact Objects and Relativistic Jets." *Astrophys. J.*, **771**, 84 (2013).

22. M. T. Reynolds et al. "A Newly Discovered Young Galactic Supernova Remnant." *Astrophys. J.*, **766**, 112 (2013).

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20. **K. Gültekin** & J. Miller. "Observable Consequences of Merger-Driven Gaps and Holes in Black Hole Accretion Disks." *Astrophys. J.*, **761**, 90 (2012).

19. R. C. E. van den Bosch, K. Gebhardt, **K. Gültekin**, G. van de Ven, A. van der Wel, & J. L. Walsh. "A seventeen billion solar-mass black hole in the compact galaxy NGC 1277." *Nature*, **491**, 729 (2012).

18. R. C. Reis, J. M. Miller, M. T. Reynolds, **K. Gültekin**, A. L. King, D. Maitra, & T. E. Strohmayer. "A 200-Second Quasi-Periodicity After the Tidal Disruption of a Star by a Dormant Black Hole." *Science*, **337**, 6097 (2012).

17. **K. Gültekin** et al. "A *Chandra* Survey of Supermassive Black Holes with Dynamical Mass Measurements." *Astrophys. J.*, **749**, 129 (2012).

16. **K. Gültekin** et al. "Is There a Black Hole in NGC 4382?" *Astrophys. J.*, **741**, 38, (2011b).

15. J. R. Jardel et al. "Orbit-based Dynamical Models of the Sombrero Galaxy (NGC 4594)." *Astrophys. J.*, **739**, 21, (2011).

14. J. M. Miller & **K. Gültekin**. "X-ray and Radio Constraints on the Mass of the Black Hole in Swift J164449.3 +573451." *Astrophys. J. Lett.*, **738**, L13 (2011).

13. **K. Gültekin** et al. "Observational Selection Effects and the M–σ Relation." *Astrophys. J.*, **738**, 17, (2011a).

12. M. Volonteri, P. Natarajan, & **K. Gültekin**. "How Important is the Dark Matter Halo for Black Hole Growth?" *Astrophys. J.*, **737**, 50 (2011).

11. K. Gebhardt et al. "The Black-Hole Mass in M87 From Gemini/NIFS Adaptive Optics Observations." *Astrophys. J.*, **729**, 119 (2011).

10. A. King et al. "A Distinctive Disk-Jet Coupling in the Seyfert-1 AGN NGC 4051." *Astrophys. J.*, **729**, 19 (2011).

9. M. Volonteri, **K. Gültekin**, & Massimo Dotti. "Gravitational Recoil: Effects on Massive Black Hole Occupation Fraction over Cosmic Time." *Mon. Not. R. Astron. Soc.*, **384**, 2143 (2010).

8. **K. Gültekin**, E. C. Cackett, J. M. Miller, T. Di Matteo, S. Markoff, & D. O. Richstone. "The Fundamental Plane of Accretion Onto Black Holes with Dynamical Masses." *Astrophys. J.*, **706**, 404 (2009c).

7. **K. Gültekin** et al. "The M–σ and M–L Relations in Galactic Bulges, and Determination of their Intrinsic Scatter." *Astrophys. J.*, **698**, 198 (2009b).

6. **K. Gültekin** et al. "A Quintet of Black Hole Mass Determinations." *Astrophys. J.*, **695**, 1577 (2009a).

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4. M. Volonteri, F. Haardt, & **K. Gültekin**. "Compact Massive Objects in Virgo Galaxies: the Black Hole Population." *Mon. Not. R. Astron. Soc.*, **384**, 1387 (2008).
3. **K. Gültekin**, M. C. Miller, & D. P. Hamilton. "Three-Body Dynamics with Gravitational Wave Emission." *Astrophys. J.*, **640**, 156 (2006).
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1. D. W. Koerner, E. L. N. Jensen, K. Cruz, T. B. Guild, & **K. Gültekin**. "A Single Circumbinary Disk in the HD 98800 Quadruple System." *Astrophys. J. Lett.*, **533**, L37-L40 (2000).

Unrefereed Publications

Invited Articles

49. **K. Gültekin**. "Astronomy: Intermediate-mass black hole found," *Nature* News & Views, **542**, 175 (2017).

Invited Book Chapters

48. M. Vestergaard & **K. Gültekin**. "Massive black holes in galactic nuclei: Observations," in The Encyclopedia of Cosmology (Set 2): Black Holes, edited by Z. Haiman (World Scientific, New Jersey, 2023) arXiv:2304.10233.

NASA Reports

47. K. Holley-Bockelmann et al. "Getting Ready for LISA: The Data, Support and Preparation Needed to Maximize US Participation in Space-Based Gravitational Wave Science," NASA *LISA* Science Team Report, arXiv:2012.02650 (2020).

White Papers

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45. J. Greene, A. Barth, A. Bellini et al. "Astro2020 Science White Paper: The Local Relics of of Supermassive Black Hole Seeds." Astro2020 Science White Paper, arXiv:1903.08670 (2019).
44. M. Koss, V. U, E. Hodges-Kluck et al. "Astro2020 Science White Paper: Black Hole Growth in Mergers and Dual AGN." Astro2020 Science White Paper, arXiv:1903.06720 (2019).

Published Conference Proceedings

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Astronomy Telegrams and Circulars

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27. J. Pinkney, **K. Gültekin**, & K. Gebhardt "Comparison of Gas and Stellar Kinematics Measurements of Black Hole Masses for the Ellipticals NGC 4552 and NGC 4697." *BAAS*, **235**, 283.04 (2020).
26. **K. Whitley*** , **K. Gültekin**, & M. Ruszkowski "Time-Domain Signatures of Low-Mass-Ratio SMBH Binaries." *BAAS*, **235**, 253.03 (2020).
25. **A. Foord*** , **K. Gültekin**, & M. Reynolds "Quantifying the rate of dual-AGN with BAYMAX." *AAS HEAD*, **17**, 106.36 (2019).
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23. **J. Runnoe*** , **K. Gültekin**, & D. S. N. Rupke "A Survey of Kiloparsec-scale Outflows in Nearby Unobscured Quasars." *BAAS*, **233**, 242.24 (2019).

22. **E. K. Hammerstein*** , **K. Gültekin**, & A. L. King "Probing the Jet Turnover Frequency Dependence on Black Hole Mass and Mass Accretion Rate." *BAAS*, **231**, 347.14 (2018).
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