Kate D. Alexander

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Northwestern University CIERA Postdoctoral Fellow <u>https://sites.northwestern.edu/kdalexander/</u> (530) 902-9694 CIERA 1800 Sherman Ave. 8th Floor, Room 8061 Evanston, IL 60201

Education

Harvard University PhD, Astronomy & Astrophysics May 2018

NSF Graduate Research Fellow. Thesis: "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Advisor: Prof. Edo Berger.

Harvard UniversityAM, Astronomy & AstrophysicsMay 2014Research Exam: "Simulating the multi-frequency B-mode sky." Advisor: Prof. John Kovac.

Brown UniversityScB, Physics, Astrophysics Track (cum laude)May 2012Senior Thesis: "Quantifying the effects of noise peaks on two-point correlation functions in
ground-based lensing data." Advisor: Prof. Ian Dell'Antonio.May 2012

Fellowships and Awards

- ◆ CIERA Postdoctoral Fellowship, Northwestern University, 2021 2023
- ◆ NASA Hubble Fellowship Program, Einstein Postdoctoral Fellow, 2018 2021
- Named to the "20 in their Twenties" list of rising stars in Chicago, Crain's Chicago Business, 2020
- National Science Foundation Graduate Research Fellowship, 2012 2015
- Bok Center Certificate of Distinction in Teaching, 2015 (Astronomy 100)
- Charles H. Smiley Prize for Excellent Contribution to the Astronomy Program, Brown University, 2012

Observing Experience

- Radio/mm: PI of active <u>VLA Large Program</u> to study tidal disruption events (300 hours, 2020-2023). PI of an additional 30 successful observing proposals (22 VLA, 5 ALMA, 2 ATCA, 1 GBT). Designed and led data reduction of VLA observations totaling over 379 hours of time (as of Nov. 2021).
- X-ray/UV: PI of 3 successful *Swift* target-of-opportunity proposals, 1 successful Chandra DDT proposal.
- **Optical:** designed and led observations on ground-based facilities including the Clay 6.5m telescope at Las Campanas Observatory (LDSS-3 spectrograph), the FLWO 1.5m telescope (FAST spectrograph), and the Kitt Peak WIYN 3.5m telescope.

Teaching Experience

• **Teaching Assistant**, Saas-Fee Advanced Course "Compact-Object Astrophysics in the Era of Multi-Messenger Astronomy," *Saas-Fee, Switzerland* (January 24-28, 2022)

- Participant, Improving Your Teaching Workshop, 235th AAS Meeting, Honolulu, HI (January 4, 2020)
- **Participant,** Mentored Discussions of Teaching Program, *Center for the Integration of Research, Teaching, and Learning (CIRTL) at Northwestern University* (Winter 2019)
- Graduate Teaching Fellow, Astronomy Department; Harvard University Astronomy 100: Methods of Observational Astronomy (Spring 2015) Astronomy 16: Stellar and Planetary Astronomy (Spring 2013)
- Undergraduate Teaching Assistant, *Physics Department; Brown University* Teaching assistant for one introductory-level astronomy course per semester from Fall 2009 to Spring 2012

Skills

- Programming and data reduction experience in Python, MATLAB, Perl, IDL, CASA, AIPS, IRAF, SuperMongo, Java, LaTeX, Mathematica, HTML, HEASoft
- Familiar with Windows, Mac OS, and Linux operating systems, Microsoft Office (including Excel), WorldWide Telescope, MaximDL
- Proficient in Spanish, some Hindi

Service and Outreach

- SOC Member, GWPAW 2022 (scheduled for December 2022 in Melbourne, Australia)
- ♦ SOC Member, The VLA Sky Survey in the Multiwavelength Spotlight (NRAOsponsored conference scheduled for September 7 – 9, 2022)
- Organizing Committee Founding Member, CIERA Social Justice Weekly Meetings (Summer 2020 – October 2021)
- NSF and NASA Review Panelist
- Referee, Monthly Notices of the Royal Astronomical Society, The Astrophysical Journal, The Astrophysical Journal Letters, Nature Astronomy, Nature Communications (2017 – Present)
- CIERA Astronomy LIVE Participant, Northwestern University (February 2021)
- External Reviewer, JCMT (2018), GMRT (2019 Present)
- SOC Member, EWASS 2019 Special Session on nuclear transients (Spring 2019)
- Space on the Hill Invited Speaker, Capitol Hill, Washington, DC (June 2018)
 - Presented at the AAS/SAO Congressional briefing "Going out with a Bang: How to Make Gold and Gravitational Waves from Exploding Stars"
- Center for Astrophysics Public Nights Volunteer (2015 2018)
 - Telescope operator at monthly public observing nights and other special events
- WorldWide Telescope Ambassador (Spring 2013 Present)
 - Presented WWT at venues including the USA Science and Engineering Festival (Washington, DC), the Cambridge Science Festival (Cambridge, MA), and the Geek is Glam STEM Expo for middle school-aged girls (Worcester, MA)
 - Created WWT tour "The Multiphase ISM" (general public) and a companion website <u>http://multiphaseism.wordpress.com</u> (advanced undergraduate level)
- Harvard Observing Project Team Lead (Fall 2012 Spring 2016)

- Led teams of Harvard undergraduates in observing asteroids, SN 2014J, Comet Lovejoy, and outbursting star AG Pegasi with the 16" Clay Telescope
- **Blogged about my trip to the South Pole, Antarctica** to upgrade the Keck Array (Winter 2014) at http://kateinantarctica.wordpress.com (3321 views from 58 countries)
- Science in the News Lecturer (Fall 2014)
 Public talk available at <u>http://sitn.hms.harvard.edu/seminars/2014/cosmosfromchaos</u>
- Physics WiSE (Women in Science and Engineering), Brown University (2008-2011)
 Co-coordinator 2009-2011

Talks and Seminars

- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium. Cornell University; Ithaca, NY; February 24, 2022
- "Lights in the darkness: Using tidal disruption events to study outflows and accretion in supermassive black holes." **Invited Seminar.** Cornell University; Ithaca, NY; February 23, 2022
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium (virtual). Dartmouth College; Hanover, NH; February 16, 2022
- "Lights in the darkness: Using tidal disruption events to study outflows and accretion in supermassive black holes." **Invited Seminar (virtual).** Dartmouth College; Hanover, NH; February 15, 2022
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium. National Centre for Radio Astrophysics (NCRA-TIFR); Pune, Maharashtra, India; November 29, 2021.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium (virtual). York University; Toronto, ON, Canada; November 23, 2021.
- "Lights in the darkness: Using tidal disruption events to study outflows and accretion in supermassive black holes." **Invited Seminar (virtual).** National Institute of Science Education and Research (NISER); Bhubaneswar, Odisha, India; November 8, 2021.
- "Tidal Disruption Events with the VLA: Past, Present, and Future." Invited Talk (virtual). The Past, Present, and Future of the VLA: Celebrating 40 Years; virtual conference; August 5, 2021.
- "Non-Thermal Emission from TDEs in the Local Universe." Contributed Talk (virtual). *EAS; virtual conference; July 2, 2021.*
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Invited Talk (virtual). EAS; virtual conference; June 30, 2021.
- "Tidal Disruption Events with CMB-S4." Invited Talk (virtual). CMB-S4 Collaboration Meeting (remote); March 9, 2021.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium (virtual). University of Chicago; Chicago, IL; February 24, 2021.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Astrophysics Colloquium (virtual). University of Oxford; Oxford, UK; November 2, 2020.

- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium (virtual). Syracuse University; Syracuse, NY; October 30, 2020.
- "Tidal Disruption Events: Multi-Messenger Probes of Outflows and Accretion in Supermassive Black Holes." Invited BBL Talk (virtual). Massachusetts Institute of Technology; Cambridge, MA; October 5, 2020.
- "Tidal Disruption Events: Multi-Messenger Probes of Outflows and Accretion in Supermassive Black Holes." Contributed Talk (virtual). NHFP Symposium; virtual conference; September 21-25, 2020.
- "Cosmic Extremes: Radio Time-Domain Astrophysics in a Multi-Messenger World." Invited Seminar (virtual). Dominion Radio Astrophysical Observatory; Penticton, BC, Canada; September 16, 2020.
- "Exploiting the mm-wave window on the transient Universe." Invited Plenary Talk (virtual). 11th CMB-S4 Workshop: Cosmology and Astrophysics in the Next Decade; virtual workshop; August 10-14, 2020.
- "Tidal Disruption Events: Multi-Messenger Probes of Outflows and Accretion in Supermassive Black Holes." Invited Talk (virtual). Compact Objects and Energetic Phenomena in the Multi-Messenger Era; NRAO virtual mini-conference; July 14-15, 2020. (full conference postponed to 2021 due to COVID-19)
- "Lights in the darkness: Using tidal disruption events to study outflows and accretion in supermassive black holes." Invited Seminar (virtual). Purdue University; West Lafayette, IN; June 5, 2020.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium (virtual). University of Florida; Gainesville, FL; April 23, 2020.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium. University of Texas Austin; Austin, TX; February 17, 2020.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Space Sciences/Astrophysics Seminar. Washington University in St. Louis; St. Louis, MO; February 7, 2020.
- "Lessons from O3: Optimizing the Search for Gravitational Wave Counterparts." Invited KIPAC Tea Talk. Kavli Institute for Particle Astrophysics and Cosmology; Palo Alto, CA; January 31, 2020.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Astrophysics Colloquium. Stanford University; Palo Alto, CA; January 30, 2020.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Seminar. Fermilab; Chicago, IL; January 27, 2020.
- "Non-Thermal Emission from TDEs: New Insights from ALMA." Invited Talk. Tidal Disruptions in Kyoto: Confronting Theory with Observations; Kyoto, Japan; January 14-16, 2020.
- "The mm View of TDEs: New Constraints on Jets, Outflows, and Supermassive Black Hole Accretion." Invited Talk. 235th AAS Meeting; Honolulu, HI; January 4-8, 2020.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited Colloquium. Clemson University; Clemson, SC; October 31, 2019.

- "The Radio View of TDEs: New Constraints on Jets, Outflows, and Supermassive Black Hole Accretion." Contributed Talk. *NHFP Symposium; Washington, DC; October 21-24, 2019.*
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Invited Colloquium. University of Maryland; College Park, MD; October 2, 2019.
- * "Radio Breakthroughs: A New Window on the Transient Sky." Invited Talk. & "Round Table Discussion: Brokers." Invited Panelist. Hot-Wiring the Transient Universe VI; Northwestern University; Evanston, IL; August 19-22, 2019.
- "Probing Relativistic Jets with Radio Observations." Astro Group Meeting Talk. *University of Bath; Bath, England; August 12, 2019.*
- "The mm view of TDEs: New constraints on jets, outflows, and supermassive black hole accretion." Contributed Talk. *Quasars in Crisis! Royal Edinburgh Observatory; Edinburgh, Scotland; August 6-9, 2019.*
- "TDEs with the ngVLA: A New Window onto the Evolution and Growth of Supermassive Black Holes." Contributed Talk. *Radio/Millimeter Astrophysical Frontiers* of the Next Decade; University of Virginia; Charlottesville, VA; June 25-27, 2019.
- "New insights into engine-driven stellar explosions from GRB 161219B." Contributed Talk. & "The future of LIGO/Virgo and Electromagnetic follow-ups." Invited Panelist. *Fifty-One Ergs; North Carolina State University; Raleigh, NC; May 20-24, 2019.*
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Contributed Talk. Midwest Workshop on Supernovae and Transients; University of Chicago; Chicago, IL; February 25-26, 2019.
- "Cosmic Extremes: Time-Domain Astrophysics in a Multi-Messenger World." Invited APS Colloquium. University of Colorado Boulder; Boulder, CO; February 4, 2019.
- "Probing Relativistic Jets with Radio Observations." Theory Group Meeting Talk. Northwestern University; Evanston, IL; January 25, 2019.
- "Probing Relativistic Jets with Radio Observations: The Case Study of GW170817." Invited CCPP Astrophysics Seminar. New York University; New York, NY; December 11, 2018.
- "Radio Observations of TDEs." Talk summarizing invited review chapter. ISSI TDE Workshop; International Space Science Institute, Bern, Switzerland; October 8-12, 2018.
- "Radio Observations of GW170817: Probing the Structure of Relativistic Jets." Contributed Talk. *Einstein Fellows Symposium; Harvard-Smithsonian Center for Astrophysics, Cambridge, MA; October 2-3, 2018.*
- "Probing TDE Outflows with Radio Observations." ITC Pizza Lunch Seminar. *Harvard University; Cambridge, MA; February 21, 2018.*
- "Radio Observations of Tidal Disruption Events." Theory Group Meeting Talk. Northwestern University; Evanston, IL; February 9, 2018.
- "Using Radio Observations of TDEs to Study Supermassive Black Holes." Invited Talk. Using Tidal Disruption Events to Study Super-Massive Black Holes; Aspen Center for Physics, Aspen, CO; January 20-26, 2018.

- "Cosmic Extremes: Probing Energetic Transients with Radio Observations. The Case Study of GW170817" AAS Dissertation Talk. 231st Meeting of the American Astronomical Society; Washington, DC; January 8-12, 2018.
- "The Radio Counterpart to GW170817." High Energy Lunch Seminar. *Harvard-Smithsonian Center for Astrophysics; Cambridge, MA; December 6, 2017.*
- "The Radio Counterpart to GW170817." Brown Bag Lunch Talk. *Massachusetts Institute* of Technology; Cambridge, MA; December 4, 2017.
- "GW170817: Afterglow Emission." Gravitational Waves Astrophysics Journal Club Talk. *Black Hole Initiative; Harvard University; Cambridge, MA; November 7, 2017.*
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." GRB Group Meeting Talk. *Goddard Space Flight Center; Greenbelt, MD; October 24, 2017.*
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Theory Talk. University of Maryland; College Park, MD; October 23, 2017.
- "GW170817: The X-ray and Radio View of an Off-axis Relativistic Jet." ITC Lunch Talk. *Harvard University; Cambridge, MA; October 19, 2017.*
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Astronomy Seminar. Columbia University; New York; NY; October 12, 2017.
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Lunch Talk. *Carnegie Observatories; Pasadena, CA; October 6, 2017.*
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Astronomy Tea Talk. *California Institute of Technology; Pasadena, CA; October 2, 2017.*
- "Probing TDE Jets and Outflows with Radio Observations." Invited Talk. TDE17: Piercing the Sphere of Influence; Cambridge University; Cambridge, UK; September 11-15, 2017.
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." Thunch Talk. Princeton University; Princeton, NJ; September 7, 2017.
- "Radio Observations of TDEs: Status and Prospects." Invited Talk. Unveiling the Physics Behind Extreme AGN Variability; University of the Virgin Islands; St. Thomas, U.S. Virgin Islands; July 10-14, 2017.
- "Long Gamma-ray Bursts with the VLA: New Insights from Radio Observations." S&P Seminar. Harvard-Smithsonian Center for Astrophysics; Cambridge, MA; January 23, 2017.
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." FLASH Talk. UCSC; Santa Cruz, CA; January 27, 2017.
- "Cosmic Extremes: Probing Energetic Transients with Radio Observations." TAC Seminar. UC Berkeley; Berkeley, CA; January 23, 2017.
- "Gamma-ray Bursts: An Observational Perspective." Contributed Talk. *Time-Domain* Astrophysics: Incorporating Observations, Theory, and Computation in the American Northeast; Radcliffe Institute for Advanced Study; Cambridge, MA; November 17-18, 2016.

- "Radio Observations of Tidal Disruption Events." Invited Young Scientist Participant. ISSI TDE Team Meeting; International Space Science Institute, Bern, Switzerland; November 7-11, 2016.
- "New Insights into Gamma-ray Burst Shock Physics with the Very Large Array." Contributed Talk. *Huntsville GRB Symposium; Huntsville, AL; October 24-28, 2016.*
- "Nuclear Radio Transients." Invited Talk. Boutiques & Experiments 2016 (Radio); Caltech; July 21-23, 2016.
- "Radio observations of tidal disruption event ASASSN-14li." Invited Talk. Jerusalem TDE Workshop; Hebrew University of Jerusalem, Israel; November 2-5, 2015.
- "Radio observations of tidal disruption event ASASSN-14li." Contributed Talk. *Time Domain Astrophysics with Swift II; Clemson, SC; October 18-22, 2015.*
- "Discovery of an outflow from radio observations of the tidal disruption event ASASSN-14li." ITC Lunch Talk. *Harvard University; Cambridge, MA; October 8, 2015.*
- "New Results from a Joint Analysis of BICEP2/Keck Array and Planck Data." Invited Talk. Brown Astrophysics Seminar Series; Brown University; Providence, RI; March 12, 2015.

Publications (9 first-author, 57 co-author)

First-author Publications

- 1. Alexander, K. D. et al. "A Late-Time Galaxy-Targeted Search for the Radio Counterpart of GW190814." 2021, Astrophysical Journal, 923, 66. 13pp.
- 2. Alexander, K. D. et al. "Radio Properties of Tidal Disruption Events." 2020, Space Science Reviews, 216, 81. 31pp. *<u>Invited Review Article</u>.
- 3. Alexander, K. D. et al. "An Unexpectedly Small Emission Region Size Inferred from Strong High-frequency Diffractive Scintillation in GRB 161219B." 2019, Astrophysical Journal, 870, 67. 12pp.
- 4. Alexander, K. D. et al. "A Decline in the X-Ray through Radio Emission from GW170817 Continues to Support an Off-axis Structured Jet." 2018, Astrophysical Journal Letters, 863, L18. 6pp.
- Alexander, K. D. et al. "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/VIRGO GW170817. VI. Radio Constraints on a Relativistic Jet and Predictions for Late-Time Emission from the Kilonova Ejecta." 2017, Astrophysical Journal Letters, 848, L21. 7pp.

*<u>Press release & video interview</u>: <u>https://kilonova.org/press.html</u>

- 6. Alexander, K. D. et al. "A Reverse Shock and Unusual Radio Properties in GRB 160625B." 2017, Astrophysical Journal, 848, 69. 13pp.
- 7. Alexander, K. D.; Wieringa, M. H.; Berger, E.; Saxton, R. D.; and Komossa, S. "Radio Observations of the Tidal Disruption Event XMMSL1 J0740-85." 2017, Astrophysical Journal, 837, 153. 7pp.
- Alexander, K. D.; Berger, E.; Guillochon, J.; Zauderer, B. A.; and Williams, P. K. G. "Discovery of an outflow from radio observations of the tidal disruption event ASASSN-14li." 2016, Astrophysical Journal Letters, 819, L25. 10pp.

 Alexander, K. D.; Soderberg, A. M.; Chomiuk, L. "A New Model for the Radio Emission from SN 1994I and an Associated Search For Radio Transients in M51." 2015, Astrophysical Journal, 806, 106. 10pp.

Co-author Publications

- 1. Hajela, A., et al. "The emergence of a new source of X-rays from the binary neutron star merger GW170817." 2022, Astrophysical Journal Letters, 927, L17. 23pp.
- 2. Bright, J. S., et al. "Radio and X-Ray Observations of the Luminous Fast Blue Optical Transient AT 2020xnd." 2022, Astrophysical Journal, 926, 112, 15pp.
- Kilpatrick, C. D., et al. "Hubble Space Telescope Observations of GW170817: Complete Light Curves and the Properties of the Galaxy Merger of NGC 4993." 2022, Astrophysical Journal, 926, 49, 15pp.
- Cendes, Y. N., Alexander, K. D., et al. "Radio Observations of an Ordinary Outflow from the Tidal Disruption Event AT2019dsg." 2021, Astrophysical Journal, 919, 127. 9pp.
- Eftekhari, T., et al. "Late-time Radio and Millimeter Observations of Superluminous Supernovae and Long Gamma-Ray Bursts: Implications for Central Engines, Fast Radio Bursts, and Obscured Star Formation." 2021, Astrophysical Journal, 912, 21. 23pp.
- 6. Jones, D. O., et al. "The Young Supernova Experiment: Survey Goals, Overview, and Operations." 2021, Astrophysical Journal, 908, 143. 24pp.
- Fong, W., et al. "The Broadband Counterpart of the Short GRB 200522A at z = 0.5536: A Luminous Kilonova or a Collimated Outflow with a Reverse Shock?" 2021, Astrophysical Journal, 906, 127. 26 pp.
- Nicholl, M., et al. "An outflow powers the optical rise of the nearby, fast-evolving tidal disruption event AT2019qiz." 2020, Monthly Notices of the Royal Astronomical Society, 499, 482. 23pp.
 *<u>Notable press interview:</u> New York Times <u>https://www.nytimes.com/2020/10/17/</u>science/astronomy-black-hole-at1910qix.html
- Schroeder, G., et al. "A Late-time Radio Survey of Short Gamma-ray Bursts at z < 0.5: New Constraints on the Remnants of Neutron-star Mergers." 2020, Astrophysical Journal, 902, 82. 15pp.
- Paterson, K., et al. "Discovery of the Optical Afterglow and Host Galaxy of Short GRB 181123B at z = 1.754: Implications for Delay Time Distributions." 2020, Astrophysical Journal Letters, 898, L32. 14pp.
- Gomez, S., et al. "The Tidal Disruption Event AT 2018hyz II: Light-curve modelling of a partially disrupted star." 2020, Monthly Notices of the Royal Astronomical Society, 497, 1925. 10pp.
- 12. Coppejans, D. L.; et al. "A Mildly Relativistic Outflow from the Energetic, Fastrising Blue Optical Transient CSS161010 in a Dwarf Galaxy." 2020, Astrophysical Journal Letters, 895, L23.
- 13. Bietenholz, M., et al. "AT 2018cow VLBI: no long-lived relativistic outflow." 2020, Monthly Notices of the Royal Astronomical Society, 491, 4735. 7pp.
- 14. Hajela, A.; Margutti, R.; Alexander, K. D.; et al. "Two years of non-thermal emission from the binary neutron star merger GW170817: rapid fading of the jet afterglow and first constraints on the kilonova fastest ejecta." 2019, Astrophysical Journal Letters, 886, L17. 12pp.

- 15. Gomez, S., et al. "A Galaxy-Targeted Search for the Optical Counterpart of the Candidate NS-BH Merger S190814bv with Magellan." 2019, Astrophysical Journal Letters, 884, L55. 10pp.
- 16. Laskar, T., et al. "A Reverse Shock in GRB 181201A." 2019, Astrophysical Journal, 884, 121. 17pp.
- 17. Saxton, R. D., et al. "XMMSL2 J144605.0+685735: a slow tidal disruption event." 2019, Astronomy & Astrophysics, 630, A98. 10pp.
- Miniutti, G.; Saxton, R. D.; Giustini, M.; Alexander, K. D.; et al. "Nine-hour X-ray quasi-periodic eruptions from a low-mass black hole galactic nucleus." 2019, Nature, 573, 7774. 4pp.
- 19. Nicholl, M., et al. "The tidal disruption event AT2017eqx: spectroscopic evolution from hydrogen rich to poor suggests an atmosphere and outflow." 2019, Monthly Notices of the Royal Astronomical Society, 488, 1878. 16pp.
- Fong, W.; Blanchard, P. K.; Alexander, K. D.; et al. "The Optical Afterglow of GW170817: An Off-axis Structured Jet and Deep Constraints on a Globular Cluster Origin." 2019, Astrophysical Journal Letters, 883, L1. 9pp.
- Hosseinzadeh, G., et al. "Follow-up of the Neutron Star Bearing Gravitational-wave Candidate Events S190425z and S190426c with MMT and SOAR." 2019, Astrophysical Journal Letters, 880, L4. 14pp.
- 22. Saxton, R., et al. "Tidal disruption events: Past, present, and future." 2019, Astronomische Nachrichten, 340, 351. 6pp.
- Laskar, T.; Alexander, K. D.; et al. "ALMA Detection of a Linearly Polarized Reverse Shock in GRB 190114C." 2019, Astrophysical Journal Letters, 878, L26. 8pp.
- 24. Margutti, R., **et al.** "An Embedded X-Ray Source Shines through the Aspherical AT 2018cow: Revealing the Inner Workings of the Most Luminous Fast-evolving Optical Transients." 2019, Astrophysical Journal, 872, 18. 32pp.
- 25. BICEP2 and **Keck Array** Collaborations. "Constraints on Primordial Gravitational Waves Using Planck, WMAP, and New BICEP2/Keck Observations through the 2015 Season." 2018, Physical Review Letters, 121, 22, 221301.
- Nicholl, M., et al. "One Thousand Days of SN2015bn: HST Imaging Shows a Light Curve Flattening Consistent with Magnetar Predictions." 2018, Astrophysical Journal Letters2, 866, 24. 7pp.
- Laskar, T., Alexander, K. D., et al. "First ALMA Light Curve Constrains Refreshed Reverse Shocks and Jet Magnetization in GRB 161219B." 2018, Astrophysical Journal, 862, 94. 23pp.
- 28. Villar, V. A., et al. "Spitzer Space Telescope Infrared Observations of the Binary Neutron Star Merger GW170817." 2018, Astrophysical Journal Letters, 862, 11. 5pp.
- 29. Laskar, T., et al. "A VLA Study of High-redshift GRBs. II. The Complex Radio Afterglow of GRB 140304A: Shell Collisions and Two Reverse Shocks." 2018, Astrophysical Journal, 859, 134. 23pp.
- Margutti, R., Alexander, K. D., et al. "The Binary Neutron Star Event LIGO/Virgo GW170817 160 Days after Merger: Synchrotron Emission across the Electromagnetic Spectrum." 2018, Astrophysical Journal Letters, 856, L18, 12pp.

- Coppejans, D. L., et al. "Jets in Hydrogen-poor Superluminous Supernovae: Constraints from a Comprehensive Analysis of Radio Observations." 2018, Astrophysical Journal, 856, 56. 14pp.
- 32. Cantiello, M., et al. "A Precise Distance to the Host Galaxy of the Binary Neutron Star Merger GW170817 Using Surface Brightness Fluctuations." 2018, Astrophysical Journal Letters, 854, L31. 7pp.
- Eftekhari, E., et al. "Radio Monitoring of the Tidal Disruption Event Swift J164449.3+573451. III. Late-time Jet Energetics and a Deviation from Equipartition." 2018, Astrophysical Journal, 854, 86. 12pp.
- Guidorzi, C., et al. "Improved constraints on H0 from a combined analysis of gravitational-wave and electromagnetic emission from GW170817." 2017, Astrophysical Journal Letters, 851, L36. 7pp.
- 35. Villar, V. A., et al. "The Combined Ultraviolet, Optical, and Near-Infrared Light Curves of the Kilonova Associated with the Binary Neutron Star Merger GW170817: Unified Data Set, Analytic Models, and Physical Implications." 2017, Astrophysical Journal Letters, 851, L21. 12pp.
- 36. Keck Array and BICEP2 Collaborations. "BICEP2 / Keck Array IX: New bounds on anisotropies of CMB polarization rotation and implications for axionlike particles and primordial magnetic fields." 2017, Physical Review D, 96, 102003. 6pp.
- 37. Abbott, B. P., et al. "A gravitational-wave standard siren measurement of the Hubble constant." 2017, Nature, 551, 85. 26pp.
- 38. Abbott, B. P., et al. "Multi-messenger Observations of a Binary Neutron Star Merger." 2017, Astrophysical Journal Letters, 848, L12. 59pp.
- 39. Soares-Santos, M., et al. "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. I. Discovery of the Optical Counterpart Using the Dark Energy Camera." 2017, Astrophysical Journal Letters, 848, L16. 7pp.
- Cowperthwaite, P.S., et al. "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. II. UV, Optical, and Near-infrared Light Curves and Comparison to Kilonova Models." 2017, Astrophysical Journal Letters, 848, L17. 10pp.
- 41. Nicholl, M., et al. "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. III. Optical and UV Spectra of a Blue Kilonova from Fast Polar Ejecta." 2017, Astrophysical Journal Letters, 848, L18. 8pp.
- 42. Chornock, R., et al. "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. IV. Detection of Near-infrared Signatures of rprocess Nucleosynthesis with Gemini-South." 2017, Astrophysical Journal Letters, 848, L19. 7pp.
- Margutti, R., et al. "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. V. Rising X-Ray Emission from an Off-axis Jet." 2017, Astrophysical Journal Letters, 848, L20. 7pp.
- 44. Blanchard, P. K., et al. "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. VII. Properties of the Host Galaxy and Constraints on the Merger Timescale." 2017, Astrophysical Journal Letters, 848, L22. 7pp.
- 45. Fong, W., et al. "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. VIII. A Comparison to Cosmological Short-duration Gamma-Ray Bursts." 2017, Astrophysical Journal Letters, 848, L23. 9pp.

- 46. Nicholl, M., et al. "Empirical constraints on the origin of fast radio bursts: volumetric rates and host galaxy demographics as a test of millisecond magnetar connection." 2017, Astrophysical Journal, 843, 84. 9pp.
- 47. Blanchard, P. K., et al. "PS16dtm: A Tidal Disruption Event in a Narrow-line Seyfert 1 Galaxy." 2017, Astrophysical Journal, 843, 106. 22pp.
- Saxton, R. D.; Read, A. M.; Komossa, S.; Lira, P.; Alexander, K. D.; Wieringa, M. H. "XMMSL1 J074008.2-853927: a tidal disruption event with thermal and non-thermal components." 2017, Astronomy & Astrophysics, 598, A29. 10pp.
- 49. Wu, W. L. K., et al. "Initial Performance of Bicep3: A Degree Angular Scale 95 GHz Band Polarimeter." 2016, Journal of Low Temperature Physics, 184, pp.765-771.
- 50. Laskar, T.; Alexander, K. D.; et al. "A Reverse Shock in GRB 160509A." 2016, Astrophysical Journal, 833, 88. 8pp.
- 51. BICEP2 and **Keck Array** Collaborations. "BICEP2/Keck Array VIII: Measurement of Gravitational Lensing from Large-scale B-mode Polarization." 2016, Astrophysical Journal, 833, 228. 12pp.
- 52. Nicholl, M., et al. "SN 2015BN: A Detailed Multi-wavelength View of a Nearby Superluminous Supernova." 2016, Astrophysical Journal, 826, 39. 31pp.
- 53. BICEP2 and **Keck Array** Collaborations. "BICEP2/Keck Array VII. Matrix Based E/B Separation Applied to BICEP2 and the Keck Array." 2016, Astrophysical Journal, 825, 66. 20pp.
- 54. BICEP2 and **Keck Array** Collaborations. "Improved Constraints on Cosmology and Foregrounds from BICEP2 and Keck Array Cosmic Microwave Background Data with Inclusion of 95 GHz Band." 2016, Physical Review Letters, 116, 3, 031302.
- 55. Keck Array and BICEP2 Collaborations. "BICEP2/Keck Array V: Measurements of B-mode Polarization at Degree Angular Scales and 150 GHz by the Keck Array." 2015, Astrophysical Journal, 811, 126. 13pp.
- 56. BICEP2/Keck, Planck Collaborations. "Joint Analysis of BICEP2/Keck Array and Planck Data." 2015, Physical Review Letters, 114, 101301.
- 57. Soderberg, A. M. et al. "Panchromatic Observations of SN 2011dh Point to a Compact Progenitor Star." 2012, Astrophysical Journal, 752, 78. 10pp.

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