

# Kate D. Alexander

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## 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 University**      **AM, Astronomy & Astrophysics**      **May 2014**

Research Exam: “Simulating the multi-frequency B-mode sky.” Advisor: Prof. John Kovac.

**Brown University**      **ScB, Physics, Astrophysics Track (cum laude)**      **May 2012**

Senior Thesis: “Quantifying the effects of noise peaks on two-point correlation functions in ground-based lensing data.” Advisor: Prof. Ian Dell’Antonio.

## Fellowships and Awards

- ◆ **NASA Hubble Fellowship Program**, Einstein Postdoctoral Fellow, 2018 – 2021
- ◆ **CIERA Postdoctoral Fellowship**, Northwestern University (expected start: 2021)
- ◆ **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
- ◆ **Barry M. Goldwater Scholarship**, 2010 - 2012
- ◆ **Robert C. Byrd Honors Scholarship**, 2008 - 2012

## Teaching Experience

- ◆ **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

## Observing Experience

- ◆ Radio/mm: PI of 16 successful observing proposals (12 VLA, 3 ALMA, 1 ATCA).  
Designed and led data reduction of VLA observations totaling over 200 hours of time.
- ◆ X-ray/UV: PI of 2 successful *Swift* target-of-opportunity proposals.
- ◆ Optical: designed and led observations on telescopes 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.

## 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

## Service and Outreach

- ◆ **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”
- ◆ **Referee**, Monthly Notices of the Royal Astronomical Society, The Astrophysical Journal, The Astrophysical Journal Letters (2017 – Present)
- ◆ **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 <http://multiphaseism.wordpress.com> (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> (2264 views from 43 countries)
- ◆ **Science in the News Lecturer** (Fall 2014)
  - Public talk available at <http://sitn.hms.harvard.edu/seminars/2014/cosmosfromchaos>
- ◆ **Physics WiSE** (Women in Science and Engineering), Brown University (2008-2011)
  - Co-coordinator 2009-2011

## Selected Talks and Seminars

- ◆ “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.*
- ◆ “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.*
- ◆ “Probing TDE Jets and Outflows with Radio Observations.” **Invited Talk**. *TDE17: Piercing the Sphere of Influence; Cambridge University; Cambridge, UK; September 11-15, 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.*
- ◆ “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.*
- ◆ “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

### *First-author Publications*

- ◆ **Alexander, K. D.** et al. “Unusually Strong and High-Frequency Diffractive Scintillation in GRB 161219B.” *Astrophysical Journal*, in press. arXiv:1806.08017.
- ◆ **Alexander, K. D.** et al. “A Decline in the X-Ray through Radio Emission from GW170817 Continues to Support an Off-axis Structured Jet.” 2017, *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.
- ◆ **Alexander, K. D.** et al. “A Reverse Shock and Unusual Radio Properties in GRB 160625B.” 2017, *Astrophysical Journal*, 848, 69. 13pp.
- ◆ **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***

- ◆ Nicholl, M., **et al.** “One Thousand Days of SN2015bn: HST Imaging Shows a Light Curve Flattening Consistent with Magnetar Predictions.” 2018, *Astrophysical Journal Letters*2, 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. 23 pp.
- ◆ Villar, V. A., **et al.** “Spitzer Space Telescope Infrared Observations of the Binary Neutron Star Merger GW170817.” 2018, *Astrophysical Journal Letters*, 862, 11. 5pp.
- ◆ 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.
- ◆ 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.
- ◆ 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.
- ◆ Abbott, B. P., **et al.** “A gravitational-wave standard siren measurement of the Hubble constant.” 2017, *Nature*, 551, 85. 26pp.
- ◆ Abbott, B. P., **et al.** “Multi-messenger Observations of a Binary Neutron Star Merger.” 2017, *Astrophysical Journal Letters*, 848, L12. 59pp.
- ◆ 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.
- ◆ 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.
- ◆ Chornock, R., **et al.** “The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. IV. Detection of Near-infrared Signatures of r-process 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.
- ◆ 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.
- ◆ 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.
- ◆ 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.
- ◆ 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.
- ◆ 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.
- ◆ Laskar, T.; **Alexander, K. D.**; et al. “A Reverse Shock in GRB 160509A.” 2016, *Astrophysical Journal*, 833, 88. 8pp.
- ◆ 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.
- ◆ Nicholl, M., **et al.** “SN 2015BN: A Detailed Multi-wavelength View of a Nearby Superluminous Supernova.” 2016, *Astrophysical Journal*, 826, 39. 31pp.
- ◆ 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.
- ◆ 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.

- ◆ **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.
- ◆ BICEP2/**Keck**, Planck Collaborations. “Joint Analysis of BICEP2/Keck Array and Planck Data.” 2015, *Physical Review Letters*, 114, 101301.
- ◆ Soderberg, A. M. **et al.** “Panchromatic Observations of SN 2011dh Point to a Compact Progenitor Star.” 2012, *Astrophysical Journal*, 752, 78. 10pp.

## References

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