Tarraneh Eftekhari

NASA Einstein Fellow, CIERA, Northwestern University

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Research Interests

I leverage radio, millimeter, and X-ray observations of energetic transients, including **fast radio bursts**, **supernovae**, and **tidal disruption events**, to answer key questions about their **progenitors**, **outflows**, and **environments**.

Education

Harvard University 2021
Ph.D, Astronomy and Astrophysics
Thesis: Unveiling the Transient Radio and Millimeter Sky
Advisor: Edo Berger, Ph.D.

Harvard University 2017
M.A., Astronomy and Astrophysics

University of New Mexico 2015
B.S., Astrophysics, Minor in Mathematics, *Magna Cum Laude*

Related Employment

NASA Einstein Fellow, Northwestern University 2022–Present

CIERA Postdoctoral Fellow, Northwestern University 2021–2022

Content Developer, HarvardX 2017–2020

- University Chemistry: Molecular Foundations and Global Frontiers
- Reclaiming Argument: An Introduction to Logical Reasoning
- The FDA and Prescription Drugs: Current Controversies in Context
- Science of the Physical Universe 30: Super-Earths and Life
- Fundamentals of Neuroscience Part 3: The Brain

Laboratory Assistant, Harvard University 2015–2016
Supervisor: Lincoln Greenhill, Ph.D.

Telescope Operator, Long Wavelength Array, University of New Mexico 2013–2015

Summer Research Assistant, ASTRON 2014
Supervisor: Richard Fallows, Ph.D.

Teaching & Advising

Co-Advisor, Alice Cai, Graduate Student, Northwestern University 2024–Present
The First Large Census of Fast Radio Burst Host Galaxies with Gemini

Co-Advisor, Yuxin Dong, Graduate Student, Northwestern University 2021–Present
Potential Analogs of a Repeating Fast Radio Burst

Tutor, Northwestern Prison Education Program 2022–Present
Robert Boyd, Undergraduate
Brian McClendon, Undergraduate

Guest Lecturer, Northwestern University 2024

Course: ASTRON 441: Supermassive Black Holes (Advanced Topics)
Prof: Claude-André Faucher-Giguère, Ph.D.

Head Teaching Fellow, Harvard University Spring 2017, 2018, 2019

Course: Science of the Physical Universe 22: From the Big Bang to the Brontosaurus and Beyond
Prof: Irwin Shapiro, Ph.D.

Awards

NASA Hubble Fellowship Program Einstein Fellowship	2022
ALMA Ambassador *($10,000 USD)*	2021
CIERA Postdoctoral Fellowship	2021
ALMA Cycle 7 Student Observing Support *($17,000 USD)*	2019
ALMA Cycle 6 Student Observing Support *($33,000 USD)*	2018
National Science Foundation Graduate Research Fellowship Honorable Mention	2017
Harvard University Bok Center Certificate of Distinction in Teaching	2017
La Serena School for Data Science Full Scholarship	2017
New Mexico Space Grant Consortium Scholarship	2014
University of New Mexico Undergraduate Research Award	2013

Telescope Time Allocations (as PI)

Very Large Array (VLA); 15 Proposals	483 hr
Including 286 hours through a VLA Large Program (24A-331)	
Gemini *(Large and Long Program)*	200 hr
Atacama Large Millimeter/submillimeter Array (ALMA); 4 proposals	48 hr
Very Long Baseline Array (VLBA); 1 proposal	3 hr
Arecibo; 1 proposal	15 hr
Submillimeter Array; 1 proposal	7 tracks
Australia Telescope Compact Array; 1 proposal	36 hours
Chandra; 5 proposals *(Total Support Funding: $186,746 USD)*	289 ks
XMM Newton; 1 proposal	120 ks

Leadership & Professional Service

Co-Chair, *CMB-S4 Sources & Transients Working Group*	2024–Present
Co-Chair, *CHIME/FRB Host Working Group*	2024–Present
Referee for *ApJ, ApJL, MNRAS & Nature*	2019–Present
SOC Member, *FRB2025 Conference*	2024–2025
SOC Member, *FRB2023 Conference*	2022–2023
Panel Member, *NASA Review*	2023
Seminar Coordinator, Astronomy Seminar, *CIERA, Northwestern University*	2022–2023
Coordinator, Journal Club, *CIERA, Northwestern University*	2022–2023
Panel Member, NRAO Annual Program Review, *National Science Foundation*	2022
Peer Review Facilitator, *Chandra Cycle 19 Peer Review*	2017
Telescope Operator, *University of New Mexico*	2013–2015

Professional Development

ALMA Ambassador Training	2022
GROWTH Astronomy School: Follow up of transients in the era of multi-messenger astronomy	2019
ICRAR/CASS Radio School	2019
Jerusalem Winter School in Theoretical Physics, The Physics of Astronomical Transients	2018

La Serena School of Data Science: Applied Tools for Data Driven Sciences	2017
NRAO Synthesis Imaging Workshop	2014, 2016, 2022

Outreach

Tutor, *Northwestern Prison Education Program (NPEP)*	2021−Present
Co-chair, Academic Support Committee at Stateville Correctional Center, *NPEP*	2021−2022
Seminar Coordinator, *Beacon Hill Seminars*	2018−2020
Speaker Chair and Blog Writer, *Harvard Science in the News*	2016−2019
Mentor to first-year graduate students, *Harvard Astronomy*	2019
Graduate student panelist, *Smithsonian Astrophysical Observatory Solar Physics REU*	2019
Local Organizing Committee, *ComSciCon*	2018
Poster Judge, *National Collegiate Research Conference*	2018
Volunteer, *Cambridge Explores the Universe*	2018
Graduate student panelist, *Wellesley College*	2017
Mentor, *Science Club for Girls*	2016−2017
Digital Mentor, *YouthAstroNet*	2016−2017
Mentor, *Harvard University Women in Stem*	2016

Invited Talks

1.	Berkeley Theoretical Astrophysics Center **Seminar**	Expected 2025
2.	Fast Radio Burst Frontiers: Unveiling Their Origins with Multi-Wavelength and Multi-Messenger Synergy	Expected 2025
3.	Canadian Astrophysical Society 2024 Annual Meeting	June 2024
4.	NASA Goddard Space Flight Center **Colloquium**	May 2024
5.	University of Illinois Urbana-Champaign **Colloquium**	2023
6.	The Astrophysics of Fast Radio Bursts II, Flatiron Institute	2023
7.	UC Santa Cruz **Colloquium**	2023
8.	Multi-wavelength follow-up of FRBs in the era of routine (sub)arcsecond localizations, University of Toronto	2023
9.	University of British Columbia **Colloquium**	2023
10.	Herzberg Astronomy and Astrophysics Research Centre **Colloquium**	2023
11.	Kavli Institute for Cosmological Physics, University of Chicago **Seminar**	2023
12.	Florida State University Astrophysics **Seminar**	2022
13.	IAU Symposium 369: The Dawn Of Cosmology & Multi-Messenger Studies With Fast Radio Bursts	2022
14.	Astrophysics with the CMB-S4 Survey – Part II: Source and Transient Science	2022
15.	Caltech Tea Talk	2022
16.	Pennsylvania State University Transients Group	2022
17.	CMB-S4 Spring 2021 Collaboration Meeting	2021
18.	The Astrophysics of Fast Radio Bursts, Flatiron Institute	2020

19. Toronto FRB Day, CITA/Dunlap Institute 2019
20. FRBs and their Possible Neutron Star Origins, Amsterdam 2019
21. Columbia University, Department of Astronomy Pizza Lunch 2019
22. Institute for Theory and Computation Luncheon, Harvard University 2019

Public Talks

1. Amateur Astronomers, Inc 2022
2. Astronomical Society of the Palm Beaches 2022
3. Gloucester Area Astronomy Club 2021
4. New Hampshire Astronomical Society 2018

Conference Contributions

1. Catching the Jet Shut Off in the Relativistic Tidal Disruption Event AT2022cmc *(Talk)* 2023
   American Astronomical Society 243rd Meeting
2. Elucidating the Origin of Fast Radio Bursts with Radio and X-ray Observations *(Talk)* 2022
   NHFP Fellows Symposium
3. Extragalactic Millimeter Transients in the Era of Next-Generation CMB Surveys *(Talk)* 2022
   3rd URSI Atlantic Radio Science Meeting
4. Millimeter Transients in the Era of CMB Surveys *(Talk)* 2021
   Spoken-WERRD Symposium
5. Unveiling the Progenitors of Superluminous Supernovae with Radio and Millimeter Observations *(Talk)* 2020
   Narayan Group Meeting, Center for Astrophysics | Harvard and Smithsonian
6. Unveiling the Progenitors of Superluminous Supernovae with Radio and Millimeter Observations *(Talk)* 2020
   TUNA Talk, National Radio Astronomy Observatory
7. Late-time Radio Observations of Superluminous Supernovae: Implications for Central Engines and Fast Radio Bursts *(Talk)* 2020
   Compact Objects Group Meeting, Flatiron Center for Computational Astrophysics
8. Late-time Radio and Millimeter Observations of Superluminous Supernovae and Long Gamma-ray Bursts *(Poster)* 2020
   Royal Astronomical Society Early Career Poster Exhibition
9. Millimeter Transients with CMB-S4 *(Talk)* 2020
   CMB-S4 Spring 2020 Collaboration Meeting, Lawrence Berkeley National Laboratory
10. Millimeter Transients in the Era of CMB Surveys *(Talk)* 2019
    Astrophysics with the CMB-S4 Survey, University of Chicago
11. Tidal Disruption Events and Fast Radio Burst *(Talk)* 2018
    Transients Group Meeting, CIERA Northwestern University
12. Radio Monitoring of the Tidal Disruption Event Swift J1644+57 *(Poster)* 2018
    Jerusalem Winter School in Theoretical Physics, The Physics of Astronomical Transients
13. On the Association of Fast Radio Bursts and Their Hosts *(Talk)* 2017
    Workshop on Fast Radio Bursts, McGill University

14. Multi-wavelength Monitoring of the Relativistic TDE Swift J1644+57 *(Poster)* 2017
American Astronomical Society 229th Meeting

15. Tidal Disruption Events: A Multi-Wavelength Approach *(Talk)* 2016
Time-Domain Astrophysics in the American Northeast

16. A Low Frequency Survey of Giant Pulses from the Crab Pulsar *(Poster)* 2015
American Astronomical Society 225th Meeting 2015

Publications

I have been an author on 66 publications with $> 11,000$ citations, including **11 first-author publications**, and 3 second-author publications. A full listing of my publications can be found on the ADS.

First Author Publications

1. *The Massive and Quiescent Elliptical Host Galaxy of the Repeating Fast Radio Burst FRB20240209A*
T. Eftekhari, Y. Dong, W. Fong, et al.
2025, Accepted to ApJL, pp. 15 (arXiv: 2410.2333)

2. *Late-time X-ray Observations of the Jetted Tidal Disruption Event AT2022cmc: The Relativistic Jet Shuts Off*
T. Eftekhari, T. Tchekhovskoy, K. D. Alexander, et al.
2024, ApJ, 974, 149, pp. 10 (arXiv: 2404.10036)

3. *An X-ray Census of Fast Radio Burst Host Galaxies: Constraints on AGN and X-ray Counterparts*
T. Eftekhari, W. Fong, A. C. Gordon, et al.
2023, ApJ, 958, 66, pp. 19 (arXiv: 2307.03766)

4. *Extragalactic Millimeter Transients in the Era of Next Generation CMB Surveys*
T. Eftekhari, E. Berger, B. D. Metzger, et al.
2022, ApJ, 935, 16, pp. 19 (arXiv: 2110.05494)

5. *Late-time Radio and Millimeter Observations of Superluminous Supernovae and Long Gamma-Ray Bursts: Implications for Obscured Star Formation, Central Engines, and Fast Radio Bursts*
T. Eftekhari, B. Margalit, C. M. B. Omand, et al.
2021, ApJ, 912, 21, pp. 23 (arXiv:2010.06612)

6. *Wandering Massive Black Holes or Analogs of the First Repeating Fast Radio Burst?*
T. Eftekhari, E. Berger, B. Margalit, B. D. Metzger, P. K. G. Williams
2020, Astrophysical Journal, 895, 98, pp. 10 (arXiv:2001.02688)

7. *A Radio Source Coincident with the Superluminous Supernova PTF10hgi: Evidence for a Central Engine and an Analogue of the Repeating FRB121102?*
T. Eftekhari, E. Berger, B. Margalit, et al.
2019, Astrophysical Journal Letters, 876, L10, pp. 10 (arXiv:1901.10479)

8. *Associating Fast Radio Bursts with Extragalactic Radio Sources: General Methodology and a Search for a Counterpart to FRB 170107*
T. Eftekhari, E. Berger, P. K. G. Williams, P. K. Blanchard
2018, Astrophysical Journal, 860, 73, pp. 9 (arXiv:1802.09525)

9. *Radio Monitoring of the Tidal Disruption Event Swift J164449.3+573451. III. Late-time Jet Energetics and a Deviation from Equipartition*
T. Eftekhari, E. Berger, B. A. Zauderer, et al.
2018, Astrophysical Journal, 854, 86, pp. 12 (arXiv:1710.07289)

10. *Associating Fast Radio Bursts with Their Host Galaxies*
T. Eftekhari & E. Berger
2017, Astrophysical Journal, 849, 162, pp. 7 (arxiv:1705.02998)

11. *A Low Frequency Survey of Giant Pulses from the Crab Pulsar*
T. Eftekhari, K. Stovall, J. Dowell, F. K. Schinzel, G. B. Taylor
2016, Astrophysical Journal, 829, 62, pp. 8 (arxiv:1607.08612)

Second Author Publications † = Graduate student mentee

1. *A Radio Study of Persistent Radio Sources in Nearby Dwarf Galaxies: Implications for Fast Radio Bursts*
Y. Dong†, **T. Eftekhari**, W. Fong, 2024, Submitted to ApJ

2. *Mapping Obscured Star Formation in the Host Galaxy of FRB 20201124A*
Y. Dong†, **T. Eftekhari**, W. Fong, A. Deller et al., 2023, ApJ

3. *Radio Monitoring of the Tidal Disruption Event Swift J164449.3+573451. IV. The Slow Fade*
Y. Cendes, **T. Eftekhari**, E. Berger, E. Polisensky et al., 2021, ApJ, 908, 125

Publications as Nth Author

1. *A repeating fast radio burst source in the outskirts of a quiescent galaxy*
V. Shah et al., 2025, Accepted to ApJL

2. *Late-time HST and JWST Observations of GRB 221009A: Evidence for a Break in the Light Curve at 50 Days*
H. Sears et al., 2024, arXiv:2412.02663

3. *A Search for Persistent Radio Sources toward Repeating Fast Radio Bursts Discovered by CHIME/FRB*
A. Ibik et al., 2024, ApJ, 976, 2

4. *PS1-11aop: Probing the Mass Loss History of a Luminous Interacting Supernova Prior to its Final Eruption with Multi-wavelength Observations*
A. Ibik et al., 2024, arXiv:2410.15140

5. *Multiwavelength constraints on the origin of a nearby repeating fast radio burst source in a globular cluster*
A. Pearlman et al., 2024, Nature Astronomy

6. *The Type I superluminous supernova catalogue I: light-curve properties, models, and catalogue description*
S. Gomez et al., 2024, MNRAS, 535, 1

7. *A Millimeter Rebrightening in GRB 210702A*
S. de Wet et al., 2024, ApJ, 974, 2

8. *The Peculiar Radio Evolution of the Tidal Disruption Event ASASSN-19bt*
C. T. Christy, et al., 2024, ApJ, 974, 1

9. *A pulsar-like swing in the polarisation position angle of a nearby fast radio burst*
R. Mckinven, M. Bhardwaj, **T. Eftekhari**, et al., 2024, Nature

10. *The Jet Opening Angle and Event Rate Distributions of Short Gamma-Ray Bursts from Late-time X-Ray Afterglows*
A. Rouco Escorial, et al., 2023, ApJ, 959, 13

11. *Constraints on the Persistent Radio Source Associated with FRB 20190520B Using the European VLBI Network*
S. Bhandari, B. Marcote, N. Sridhar, **T. Eftekhari**, et al., 2023, ApJ, 958, 19

12. *A Fast Radio Burst in a Compact Galaxy Group at $z \sim 1$*
A. C. Gordon, et al., 2023, ApJ, 963, 34

13. *Luminous Radio Emission from the Superluminous Supernova 2017ens at 3.3 yr after Explosion*
R. Margutti, et al., 2023, ApJ, 954, 45

14. *The Demographics, Stellar Populations, and Star Formation Histories of Fast Radio Burst Host Galaxies: Implications for the Progenitors*
A. C. Gordon, W. Fong, C. D. Kilpatrick, **T. Eftekhari**, et al., 2023, 954, 80

15. *Multiwavelength Constraints on the Origin of a Nearby Repeating Fast Radio Burst Source in a Globular Cluster*
A. B. Pearlman et al., 2023, Nature

16. *A radio-emitting outflow produced by the tidal disruption event AT2020vwl*
A. J. Goodwin et al., 2023, MNRAS, 522, 5084

17. *Millimeter Observations of the Type II SN 2023ixf: Constraints on the Proximate Circumstellar Medium*
E. Berger et al., 2023, ApJ, 951L, 31

18. *A non-repeating fast radio burst in a dwarf host galaxy*
S. Bhandari et al., 2022, ApJ, 948, 67

19. *The Jet Opening Angle and Event Rate Distributions of Short Gamma-ray Bursts from Late-time X-ray Afterglows*
A. Rouco Escorial et al., 2022, ApJ, 959, 13

20. *Evidence for X-Ray Emission in Excess to the Jet-afterglow Decay 3.5 yr after the Binary Neutron Star Merger GW 170817: A New Emission Componen*
A. Hajela, et al., 2022, ApJ, 972L, 17

21. *Chronicling the Host Galaxy Properties of the Remarkable Repeating FRB 20201124A*
W. Fong et al., 2021, ApJ, 919L, 23

22. *Probabilistic Association of Transients to their Hosts (PATH)*
K. Aggarwal, et al., 2021, ApJ, 911, 95

23. *A Late-Time Galaxy-Targeted Search for the Radio Counterpart of GW190814*
K. D. Alexander, et al., 2021, ApJ, 923, 66

24. *Radio Observations of an Ordinary Outflow from the Tidal Disruption Event AT2019dsg*
Y. Cendes, et al., 2021, ApJ, 919, 127

25. *The Broadband Counterpart of the Short GRB 200522A at $z = 0.5536$: A Luminous Kilonova or a Collimated Outflow with a Reverse Shock?*
W. Fong et al., 2022, ApJ, 906, 127

26. *The Tidal Disruption Event AT 2018hyz II: Light-curve modelling of a partially disrupted star*
S. Gomez et al., 2020, MNRAS, 497, 1952

27. *AT 2018cow VLBI: No Long-Lived Relativistic Outflow*
M. F. Bietenholz et al., 2020, MNRAS, 491, 4735

28. *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*
A. Hajela et al., 2019, ApJ, 886, L17

29. *A Galaxy-Targeted Search for the Optical Counterpart of the Candidate NS-BH Merger S190814bv with Magellan*
S. Gomez et al., 2019, ApJ, 884, L55

30. *The Optical Afterglow of GW170817: An Off-axis Structured Jet and Deep Constraints on a Globular Cluster Origin*
W. Fong et al., 2019, ApJL, 883, L1

31. *Follow-up of the Neutron Star Bearing Gravitational Wave Candidate Events S190425z and S190426c with MMT and SOAR*
G. Hosseinzadeh et al., 2019, ApJL, 880, L4

32. *An embedded X-ray source shines through the aspherical AT2018cow: revealing the inner workings of the most luminous fast-evolving optical transients*
R. Margutti et al., 2019, ApJ, 872, 18

33. *Unveiling the Engines of Fast Radio Bursts, Super-Luminous Supernovae, and Gamma-Ray Bursts*
B. Margalit et al., 2018, MNRAS, 481, 2407

34. *Spitzer Space Telescope Infrared Observations of the Binary Neutron Star Merger GW170817*
V. A. Villar et al. 2018, ApJL, 862, L11

35. *A Decline in the X-ray through Radio Emission from GW170817 Continues to Support an Off-Axis Structured Jet*
K. D. Alexander et al., 2018, ApJL, 863, 18L

36. *A Precise Distance to the Host Galaxy of the Binary Neutron Star Merger GW170817 Using Surface Brightness Fluctuations*
M. Cantiello et al., 2018, ApJ, 854, 31L

37. *The Binary Neutron Star event LIGO/VIRGO GW170817 a hundred and sixty days after merger: synchrotron emission across the electromagnetic spectrum*
R. Margutti et al., 2018, ApJ, 856, 18L

38. *Design and characterization of the Large-Aperture Experiment to Detect the Dark Age (LEDA) radiometer systems* D. Price et al., 2018, MNRAS, 478, 4193

39. *Improved Constraints on H0 from a combined analysis of gravitational-wave and electromagnetic emission from GW170817*
C. Guidorzi et al., 2017, ApJ, 851, 36L

40. *A gravitational-wave standard siren measurement of the Hubble constant*
B. P. Abbott et al., 2017, Nature, 551, 85

41. *The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/VIRGO GW170817. II. UV, Optical, and Near-IR Light Curves and Comparison to Kilonova Models*
P. S. Cowperthwaite et al., 2017, ApJ, 848, 17L

42. *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*
M. Nicholl et al., 2017, ApJ, 848, L18

43. *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*
R. Chornock et al., 2017, ApJ, 848, L19

44. *The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/VIRGO GW170817. V. Rising X-ray Emission from an Off-Axis Jet*
R. Margutti et al., 2017, ApJ, 848, L20

45. *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*
K. D. Alexander et al., 2017, ApJ, 848, L21

46. *The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/VIRGO GW170817. VII. Properties of the Host Galaxy and Constraints on the Merger Timescale*
P. K. Blanchard et al., 2017, ApJ, 848, L22

47. *The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/VIRGO GW170817. VIII. A Comparison to Cosmological Short-duration Gamma-ray Bursts*
W. Fong et al., 2017, ApJ, 848, L23

48. *Bifrost: a Python/C++ Framework for High-Throughput Stream Processing in Astronomy*
M. D. Cranmer et al., 2017, JAI, 6, 1750007

49. *Empirical constraints on the origin of fast radio bursts: volumetric rates and host galaxy demographics as a test of millisecond magnetar connection*
M. Nicholl et al., 2017, ApJ, 843, 84

50. *Bayesian Constraints on the Global 21-cm Signal from the Cosmic Dawn*
G. Bernardi et al., 2016, MNRAS, 461, 3

51. *Digital Signal Processing using Stream High Performance Computing: A 512-input Broadband Correlator for Radio Astronomy*
J. Kocz et al., 2015, JAI, 4 50003

52. *Pulsar Observations Using the First Station of the Long Wavelength Array and the LWA Pulsar Data Archive*
K. Stovall et al., 2015, ApJ, 808, 156