

Anna Y. Q. Ho

(Last updated: May 2022)

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PRIMARY RESEARCH INTERESTS

Stellar death (supernovae, gamma-ray bursts), transients, time-domain astronomy, high-energy astrophysics, radio and sub-millimeter interferometry, large surveys

EDUCATION & APPOINTMENTS

| | |
|--------------|--|
| Fall 2022– | Assistant Professor, Astronomy Department, Cornell |
| 2020–Present | Miller Fellow, Astronomy Department, U.C. Berkeley |
| 2020–Present | Affiliate, Lawrence Berkeley National Laboratory |
| 2020 | Ph.D., California Institute of Technology, Astrophysics <ul style="list-style-type: none">• Thesis: <i>The Landscape of Relativistic Stellar Explosions</i>• Advisor: Prof. Shri Kulkarni |
| 2017 | M.S., California Institute of Technology, Astrophysics |
| 2014–2015 | Fulbright Scholar, Max Planck Institute for Astronomy, Heidelberg, Germany <ul style="list-style-type: none">• Host: Prof. Hans-Walter Rix |
| 2014 | B.S., Massachusetts Institute of Technology, Physics |

AWARDS & HONORS

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| 2021 | Springer Thesis Prize <i>In recognition of outstanding Ph.D. research in the physical sciences.</i> |
| 2020 | AAS Rodger Doxsey Travel Prize |
| 2014–2019 | National Science Foundation Graduate Research Fellowship |
| 2019 | Keck Institute for Space Studies Affiliate |
| 2017 | TA Award, Caltech <i>For being one of the highest rated TAs for the Spring 2017 term.</i> |
| 2017 | Garmire Scholarship, Caltech <i>Annual award for an outstanding graduate student in Physics, Math, and Astronomy.</i> |
| 2014 | MIT Karl Taylor Compton Prize <i>The highest awards presented by the Institute to students...in recognition of excellent achievements in citizenship and devotion to the welfare of MIT.</i> |
| 2014 | MIT Ida M. Green Fellowship (declined) <i>For the MIT Graduate Program in Science Writing</i> |
| 2013 | First Place, MIT DeWitt Wallace Prize for Science Writing for the Public |
| 2012 | MIT Burchard Scholar |

SELECTED PUBLICITY

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| 2021 | Quanta , <i>New Kind of Space Explosion Reveals the Birth of a Black Hole</i> |
| 2020 | Wrote the Scientific American cover article, <i>Extreme Supernovae</i> |
| 2020 | Science News , <i>A weird cosmic flare called the Cow now has company</i> |
| 2020 | Science Daily , <i>Astronomers discover new class of cosmic explosions</i> |
| 2020 | Sky & Telescope , <i>Two New Beasts for an Explosive Zoo</i> |
| 2019 | Wrote article for the Submillimeter Array Newsletter , <i>SMA Observations of AT2018cow: A Prototype for Millimeter Time-domain Astronomy</i> |

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| 2019 | Science News , <i>The cosmic Cow may be a strange supernova</i> |
| 2019 | The Washington Post , <i>Scientists had never seen anything like this supernova</i> |
| 2019 | WIRED , <i>We may have finally spotted a star turning into a black hole</i> |
| 2018 | Nature News , <i>Holy Cow! Astronomers agog at mysterious new supernova</i> |

PAPERS IN PRESS

First Author

- [1] **Ho, A. Y. Q.**, Perley, D. A., et al. 2022, *Cosmological Fast Optical Transients with the Zwicky Transient Facility: A Search for Dirty Fireballs*, submitted to the Astrophysical Journal, ([arXiv:2201.12366](#))
- [2] **Ho, A. Y. Q.**, Margalit, B., et al. 2021, *Luminous Millimeter, Radio, and X-ray Emission from ZTF20acigmel (AT2020xnd)*, accepted for publication in the Astrophysical Journal, ([arXiv:2110.05490](#))
- [3] **Ho, A. Y. Q.**, Perley, D. A., et al. 2021, *The Photometric and Spectroscopic Evolution of Rapidly Evolving Extragalactic Transients in ZTF*, submitted to the Astrophysical Journal, ([arXiv:2105.08811](#))

Selected Co-author

- [1] Yao, Y., **Ho, A. Y. Q.**, et al. 2022, *The X-ray and Radio Loud Fast Blue Optical Transient AT2020mrf: Implications for an Emerging Class of Engine-Driven Massive Star Explosions*, submitted to the Astrophysical Journal, ([arXiv:2112.00751](#))

PUBLISHED PAPERS IN REFEREED JOURNALS

First Author

- [1] **Ho, A. Y. Q.**, Perley, D. A., Beniamini, P., et al. 2020, *ZTF20aaajnsq (AT2020blt): A Fast Optical Transient at $z \approx 2.9$ With No Detected Gamma-Ray Burst Counterpart*, The Astrophysical Journal, **905**, 98 ([arXiv:2006.10761](#))
- [2] **Ho, A. Y. Q.**, Kulkarni, S., R., et al. 2020, *SN2020bvc: a Broad-lined Type Ic Supernova with a Double-peaked Optical Light Curve and a Luminous X-ray and Radio Counterpart*, The Astrophysical Journal, **902**, 86 ([arXiv:2004.10406](#))
- [3] **Ho, A. Y. Q.**, Perley, D. A., et al. 2020, *The Koala: A Fast Blue Optical Transient with Luminous Radio Emission from a Starburst Dwarf Galaxy at $z = 0.27$* , The Astrophysical Journal, **895**, 1 ([arXiv:2003.01222](#))
- [4] **Ho, A. Y. Q.**, Corsi, A., et al. 2020, *The Broad-lined Ic Supernova ZTF18aaqjovh (SN 2018bvw): An Optically-discovered Engine-driven Supernova Candidate with Luminous Radio Emission*, The Astrophysical Journal, **893**, 132 ([arXiv:1912.10354](#))
- [5] **Ho, A. Y. Q.**, Goldstein, D. A., Schulze, S., et al. 2019, *Evidence for Late-stage Eruptive Mass-loss in the Progenitor to SN2018gep, a Broad-lined Ic Supernova: Pre-explosion Emission and a Rapidly Rising Luminous Transient*, The Astrophysical Journal, **887**, 169H ([arXiv:1904.11009](#))
- [6] **Ho, A. Y. Q.**, Phinney, E. S., Ravi, V., et al. 2019, *AT2018cow: a luminous millimeter transient*, The Astrophysical Journal, **871**, 73 ([arXiv:1810.10880](#))
- [7] **Ho, A. Y. Q.**, Kulkarni, S.R., Nugent, P. E. et al. 2018, *iPTF Archival Search for Fast Optical Transients*, The Astrophysical Journal Letters, **854**, 13 ([arXiv:1712.00949](#))
- [8] **Ho, A. Y. Q.**, Rix, H.-W., Ness, M. K., Hogg, D. W., et al. 2017, *Masses and Ages for 230,000 LAMOST Giants, via Their Carbon and Nitrogen Abundances*, The Astrophysical Journal, **841**, 40 ([arXiv:1609.03195](#))

- [9] **Ho, A. Y. Q.**, Ness, M. K., Hogg, D. W., et al. 2017, *Label Transfer from APOGEE to LAMOST: Precise Stellar Parameters for 450,000 LAMOST Giants*, The Astrophysical Journal, **836**, 5 ([arXiv:1602.00303](#))

Selected Co-author

- [1] Margalit, B., Quataert, E., & **Ho, A. Y. Q.** 2022, *Optical to X-Ray Signatures of Dense Circumstellar Interaction in Core-collapse Supernovae*, The Astrophysical Journal, **928**, 122 ([arXiv:2109.09746](#))
- [2] Perley, D. A., **Ho, A. Y. Q.** et al. 2021, *Real-time discovery of AT2020axd: a fast, luminous ultraviolet transient with minimal radioactive ejecta*, MNRAS, **508**, 5138 ([arXiv:2103.01968](#))
- [3] Dong, D. Z., et al. 2021, *A transient radio source consistent with a merger-triggered core collapse supernova*, Science, 373, 1125 ([arXiv:2109.01752](#))
- [4] Andreoni, I., et al. 2021, *Fast-transient Searches in Real Time with ZTFReST: Identification of Three Optically Discovered Gamma-Ray Burst Afterglows and New Constraints on the Kilonova Rate*, ApJ, 918, 63 ([arXiv:2104.06352](#))
- [5] De, K., et al. 2020, *The Zwicky Transient Facility Census of the Local Universe I: Systematic search for Calcium rich gap transients reveal three related spectroscopic sub-classes*, The Astrophysical Journal, **905**, 58 ([arXiv:2004.09029](#))
- [6] Perley, D. A., et al. 2020, ApJ, *The Zwicky Transient Facility Bright Transient Survey. II. A Public Statistical Sample for Exploring Supernova Demographics*, The Astrophysical Journal, **904**, 35 ([arXiv:2009.01242](#))
- [7] Duffell, P. C. & **Ho, A. Y. Q.** 2020, *How Dense a CSM is Sufficient to Choke a Jet?*, The Astrophysical Journal, **900**, 193
- [8] Szkody, P., Diczynski, B., **Ho, A. Y. Q.**, et al. 2020, *Cataclysmic Variables from the First Year of the Zwicky Transient Facility*, Astronomical Journal, **159**, 198 ([arXiv:2002.08447](#))
- [9] Casey, A.R., **Ho, A. Y. Q.**, et al. 2019, *Tidal interactions between binary stars drives lithium production in low-mass red giants*, The Astrophysical Journal, **880**, 125 ([arXiv:1902.04102](#))
- [10] Graham, M. J. et al. 2019, *The Zwicky Transient Facility: Science Objectives*, Publications of the Astronomical Society of the Pacific, 131, 078001 ([arXiv:1902.01945](#))
- [11] Bellm, E. C. et al. 2019, *The Zwicky Transient Facility: System Overview, Performance, and First Results*, Publications of the Astronomical Society of the Pacific, 131, 018002 ([arXiv:1902.01932](#))
- [12] Ness, M., et al. 2016, *Spectroscopic Determination of Masses (and Implied Ages) for Red Giants*, The Astrophysical Journal, **823**, 114 ([arXiv:1511.08204](#))
- [13] Ness, M., et al. 2015, *The Cannon: A data-driven approach to stellar label determination*, The Astrophysical Journal, **808**, 16 ([arXiv:1501.07604](#))

PROFESSIONAL SERVICE

| | |
|--------------|--|
| 2021–Present | Co-chair, Sources & Transients Working Group, CMB-S4 |
| 2019–Present | Referee/reviewer for ApJ, ApJL, MNRAS, Nature Astronomy |
| 2017–Present | Interviewer, MIT Admissions |
| 2022 | Member, Scientific Organizing Committee, “Astrophysics with the CMB-S4 Survey” |
| 2022 | Member, Miller Annual Symposium Organizing Committee |
| 2021–2022 | Co-organizer, Theoretical Astrophysics Center Seminar Series, UC Berkeley |
| 2021–2022 | Organizer, Explosive Astronomy Seminar Series, UC Berkeley |
| 2021 | Member, Chandra Time Allocation Committee |
| 2021 | Member, Gemini Time Allocation Committee |

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| 2021 | Co-organizer, Cal-URSA Research Program |
| 2021 | Co-organizer, Session on Transients with CMB-S4, CMB-S4 Summer Workshop |
| 2021 | Organizer, Workshop on Status of Millimeter-Transient Searches (virtual) |
| 2019–2020 | Graduate representative to the faculty, Astronomy Department |
| 2017–2020 | Graduate student mentor, Astronomy Department |
| 2018 | Graduate admissions committee, Astronomy Department |
| 2018 | Department representative, Graduate Student Council |
| 2014 | AAS Representative, Congressional Visits Day, Washington DC |

SUCCESSFUL OBSERVING PROPOSALS AS PRINCIPAL INVESTIGATOR

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| Millimeter | 20 proposals: 11 SMA (426 hr), 7 NOEMA (104 hr), 2 ALMA (12 hr) <ul style="list-style-type: none"> • SMA Regular: eight (18B, 19A&B, 20A&B, 21A&B, 22A), 35 tracks (≈ 210 hrs) • SMA DDT: three (2\times18A, 21B), 36 tracks (≈ 216 hrs) • NOEMA Regular: five (19B, 20B, 21A&B, 22B), 91.8 hrs • NOEMA DDT: two (2\times20A), 12.0 hrs • ALMA Regular: one (Cycle 7), 9.7 hr • ALMA DDT: one (Cycle 5), 2.6 hr |
| Radio | 14 proposals: 11 VLA (150 hrs), 2 VLBA (48 hrs), 1 GMRT (3 hrs) <ul style="list-style-type: none"> • VLA Regular: eight (13A, 19A, 2\times20A, 20B, 21A, 21B, 22B) totaling 142.78 hrs • VLA DDT: three (17A, 17B, 19B) totaling 7 hrs • VLBA DDT: two (18A, 20A) totaling 48 hrs • GMRT DDT: one (Cycle 36), totaling 3 hrs |
| Optical | 4 proposals: 2 Gemini (15.4 hrs), 2 Palomar 60-inch (11.95 hrs) <ul style="list-style-type: none"> • Gemini: two (21A, 22A), 9.2 hr GMOS-S & 6.2 hr GMOS-N • Palomar 60-inch: two (2019, 2020), totaling 11.95 hrs |
| X-ray | 34 <i>Swift</i> ToO observations (each 3–5 ks; total ≈ 150 ks) 2 <i>Chandra</i> DDT proposals (Cycle 21, 22) totaling 40 ksec |

DATA REDUCTION, OBSERVING, PROGRAMMING EXPERIENCE

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| Reduction | Radio (VLA), optical (DBSP, LRIS, Gemini), X-ray (Swift/XRT, Chandra/ACIS) |
| Observing | Millimeter (SMA; 5 nights), optical (DBSP/LRIS; 21 nights) |
| Software | Python, CASA, LaTeX, Mathematica, HTML, Postgres, SQL |

TEACHING AND MENTORING

Student Mentoring

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| Summer 2022 | Co-supervised (with Peter Nugent) two undergraduate students at LBL |
| Summer 2021 | Co-supervised (with Peter Nugent) four undergraduate students at LBL |
| 2016–2020 | Graduate-student mentor for two students at Caltech (Lee Rosenthal, Yuhan Yao) |

University Teaching

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| 2017 | TA for Ay1 at Caltech (undergraduate course, “The Evolving Universe”) Recognized as “outstanding TA” by Caltech registrar |
| 2016 | TA for Ay122b at Caltech (graduate course, “Radio Astronomy”) |
| 2016 | TA for Ay20 at Caltech (undergraduate course, “Basic Astronomy and the Galaxy”) |

Workshops

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| 2018 | Instructor, ZTF Summer School |
| 2016 | Lead Instructor, Gemini Observatory Workshop on Data-Driven Modeling of Spectra |

K-12 Teaching

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| 2019 | 2-day workshop for K-12 teachers, Huntington Library, Pasadena CA |
| 2016 | 9-week class for 7-12 year olds, Institute for Educational Advancement, Pasadena CA |
| 2010-2014 | Designed and taught 12 classes for over 500 middle- and high-school students, MIT |
| 2010 | High-school teaching assistant for 1 month, Pueblo Pintado Navajo Reservation, NM |

RECENT INVITED TALKS

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| 2022 | Colloquium, Radboud University, Nijmegen, Netherlands |
| 2022 | Colloquium, Carnegie Observatories, Pasadena CA |
| 2022 | Talk, APS April Meeting, Cecilia Payne-Gaposchkin Dissertation Award Finalist |
| 2022 | CCAT-Prime/FYST Collaboration Meeting (virtual) |
| 2022 | Tor Vergata Astrophysics Seminar (virtual) |
| 2022 | Special Physics & Astronomy Seminar, Northwestern University, Evanston IL |
| 2022 | Colloquium, U.T. Austin, Austin TX |
| 2022 | Colloquium, Cornell University, Ithaca NY |
| 2021 | Colloquium, Max Planck Institute for Astronomy, Heidelberg, Germany (virtual) |
| 2021 | Colloquium, U.C. Santa Cruz |
| 2021 | Talk, SuperVirtual (virtual) |
| 2021 | Seminar, Kavli Institute for Cosmological Physics, U. Chicago |
| 2021 | Astro Seminar, Center for Cosmology and Particle Physics, NYU |
| 2021 | Colloquium, Jodrell Bank Centre for Astrophysics (virtual) |
| 2021 | Seminar, Princeton Gravity Initiative (virtual) |
| 2021 | Colloquium, Centre of Astrophysics and Supercomputing, Swinburne University of Technology (virtual) |
| 2021 | Talk, BigBoom, University of Arizona (virtual) |
| 2021 | Seminar, CGCA, UW-Milwaukee (virtual) |
| 2020 | Astroseminar, Florida State University (virtual) |
| 2020 | Colloquium, Institute for Theory and Computation, Harvard CfA (virtual) |
| 2019 | Keck Institute for Space Studies, Pasadena, CA |
| 2019 | Stars and Planets Seminar, Harvard-Smithsonian CfA, Cambridge, MA |
| 2019 | SMA Seminar, Harvard-Smithsonian CfA, Cambridge, MA |
| 2019 | Brown Bag Lunch, MIT, Cambridge, MA |

SCIENCE POLICY

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| 2018-2020 | Founder and Chair, Science Policy Committee, Caltech Graduate Student Council |
| 2017-2019 | Vice President, Science and Engineering Policy At Caltech (Student Club) |
| 2017 | International Summer Symposium on Science and World Affairs, Germany One of 40 international researchers selected to participate Talk title: <i>Towards a Framework for Space Traffic Control</i> |
| 2017 | Selected by Caltech to participate in Congressional Visits Day, Washington DC |
| 2014 | Selected by the American Astronomical Society to participate in Congressional Visits Day, Washington DC |

COMMUNITY ENGAGEMENT

See also “K-12 Teaching” in “Teaching and Mentoring” section.

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| 2022 | Keynote Speaker, Annual Cray User Group Meeting, Monterey CA |
| 2021 | Compass Lecture, UC Berkeley |
| 2021 | Speaker, Riverside Astronomical Society (virtual) |
| 2019 | Speaker, Greenway Talk Series, Palomar Observatory |
| 2019 | Speaker, Owens Valley Radio Observatory Lecture Series |
| 2019 | Speaker, Caltech Graduate Research Spotlight |

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| 2019 | Speaker, Ventura County Astronomical Society |
| 2019 | Speaker, Greenway Talk Series, Palomar Observatory |
| 2018 | Contributing Writer, Caltech Letters |
| 2018 | Speaker, College of the Canyons Star Party |
| 2018 | Visitor, 8th-grade class, St. Philip the Apostle School, Pasadena CA |
| 2017 | Volunteer, Orbit Deep Learning Days, Huntington Library, Pasadena CA |
| 2017 | Speaker, Astro on Tap, Pasadena CA |
| 2017 | Speaker, Riverside Astronomical Society |
| 2017 | Speaker, Ventura County Astronomical Society |
| 2017 | Speaker, High School Summer Camp, Culver City CA |
| 2016 | Speaker, Santa Monica Astronomy Club |
| 2016 | Volunteer, Field Trip, iChicas After-school Program |
| 2015 | Speaker, St. Philip Reverse Science Fair, Pasadena CA |
| 2015 | Volunteer, Webster Elementary Science and Stargazing Night, Pasadena CA |
| 2015-2020 | Volunteer, Caltech Astronomy Outreach program |
| 2014–2015 | Volunteer, Center for Astronomy Education and Outreach, Heidelberg, Germany |
| 2014 | AAS Astronomy Ambassadors Workshop, AAS 223rd Meeting |
| 2012–2013 | Volunteer, McCormick Public Observatory, Charlottesville VA |