

Jeremiah K. Darling

Professor of Astrophysics

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EDUCATION

Cornell University. Ithaca, NY.

Ph.D. (2/02) and **M.S.** (2/00) in Astrophysics

Dissertation: “*The Arecibo OH Megamaser Survey*”

Committee: R. Giovanelli (Major Advisor, Astrophysics), S. Teukolsky (Minor Advisor, Physics), M. Haynes, J. Cordes, D. Chernoff

California Institute of Technology. Pasadena, CA.

B.S. with Honors in Physics 6/96

Major Advisor: J. Pine (Physics); Research Advisors: S. G. Djorgovski & J. Cohen (Astronomy)

FELLOWSHIPS & AWARDS

Kavli Fellow. (2013)

Provost’s Faculty Achievement Award. (10/11) For the paper “Water Masers in the Andromeda Galaxy: The First Step Toward Proper Motion” (*J. Darling*, 2011, *ApJ*, 732, L2)

Hubble Fellowship. (8/05–8/06)

Barbara McClintock Fellowship. (7/04–8/05)

Carnegie Fellowship. (7/02–7/04)

Cranson W. and Edna B. Shelly Award for Graduate Research in Astronomy. (5/00) Cornell Astronomy Department for “outstanding graduate student research achievements in astronomy.”

Elanor York Prize. (5/99) Cornell Astronomy Department for the “most outstanding graduate student.”

NASA Space Grant Fellowship. (8/96–12/96) Awarded by Cornell Astronomy Department.

Caltech Merit Scholarship. (9/95–6/96) Awarded by Caltech.

Doris S. Perpall SURF Speaking Award (First Place). (1/96) Awarded by Caltech/NASA JPL for summer research presentation competition.

Doris S. Perpall SURF Speaking Award (Semi-Finalist). (10/94) Awarded by Caltech/NASA JPL.

Millikan Book Scholarship. (9/92–6/94) Awarded by Caltech Admissions Office.

National Merit Scholarship. (9/92–6/93)

ACADEMIC EMPLOYMENT & RESEARCH

Director (7/21–present) Center for Astrophysics and Space Astronomy, University of Colorado.

Full Professor (8/20–present) University of Colorado. Dark matter detection. Massive black holes. Gravity in the Galactic Center. Masers in stars and galaxies. Real-time cosmology. Astrometry, proper motion, and precision spectroscopy. Atomic clocks in space.

Associate Professor (5/13–8/20) University of Colorado. Real-time cosmology. Astrometry, proper motion, and precision spectroscopy. Massive black holes. Gravity in the Galactic Center. Physical probes of galactic and extragalactic star formation. Physical constants, the neutron lifetime, and dark matter detection.

Associate Director (7/16–7/18) Center for Astrophysics and Space Astronomy, University of Colorado.

Associate Chair (7/14–6/15) Astrophysical and Planetary Sciences Department, University of Colorado.

Assistant Professor (8/06–5/13) University of Colorado. Masers, molecules, magnetic fields, gas, and dust in galaxies. Applications of formaldehyde to star formation, galaxy evolution, and cosmology. Search for maser emission from “Hot Jupiters.” Observation of an occultation of a radio lobe by Enceladus and Saturn’s E-ring. Constraints on the cosmic evolution of fundamental physical constants. The co-evolution of galaxies and massive black holes. The proper motion and distance of the Andromeda Galaxy. Hydrogen and molecular absorption at high and low redshift. Data mining to expand discovery space. Precision astrophysics. Tests of cosmology and general relativity.

Hubble Fellow (8/05–8/06) University of Colorado. Search for radio-loud probes of the epoch of reionization. H I 21 cm surveys for damped Ly α systems. Surveys for high redshift molecular absorption. Extragalactic formaldehyde as a tracer of cold dense molecular gas. Constraints on the evolution of physical constants. H I rotation widths of AGN host galaxies.

Barbara McClintock Fellow (7/04–8/05), **Carnegie Fellow** (7/02–7/04). Carnegie Observatories. Synthesis imaging, photometric, long-slit, and integrated field studies of OH megamasers and merging galaxies. OH megamaser variability studies. Surveys for high redshift OH megamasers. Maser searches toward super star clusters and extrasolar planets. The radio X-ray connection in galaxy groups. Constraints on the evolution of physical constants. Search for radio-loud probes of the epoch of reionization. H I 21 cm surveys for damped Ly α systems. Extragalactic surveys for molecular transitions.

Research Associate. (10/01–6/02) Cornell University. Monitoring campaign to characterize the variability, size scales, and mechanisms of OH megamasers. VLBA spectral line observations of OH megamasers at $z \simeq 0.2$ to characterize maser size, distribution, and mechanism (with A. Peck & K. Menten). Optical spectral classification of OH megamaser galaxies. Survey for methanol megamasers (with P. Goldsmith, D. Li, & R. Giovanelli).

Thesis Research. (3/99–10/01) Cornell. The Arecibo OH Megamaser Survey. Results applied to merging rate of galaxies and a study of OH megamaser phenomenon. Discovered 50 OH megamasers.

Graduate Research. (3/00–6/01) Cornell. Study of environments of damped Ly α systems, bias, and evolution of “typical” galaxies (with A. Wolfe, E. Gawiser, J. Cooke, & J. Prochaska).

Graduate Research. (5/98–5/01) Cornell. R. Giovanelli. Astronomical site survey above 17,000 feet in northern Chile to characterize the seeing and water vapor profile throughout the seasonal cycle.

Undergraduate Research Assistant. (8/95–7/96) California Institute of Technology (Caltech). S. G. Djorgovski. Continued the high-redshift quasar search; discovered four quasars with $z > 4$.

NASA Summer Undergraduate Research Fellow. (SURF; 6/95–8/95) Caltech. S. G. Djorgovski. Search for high redshift quasars using the Second Digitized Palomar Sky Survey and the Palomar 5m telescope. Discovered six quasars with $z > 4$.

Undergraduate Research Assistant. (8/94–6/95) Caltech. J. Cohen. Observed and constructed low noise light curves for 60 RR Lyrae variable stars in the globular cluster M15.

NASA SURF. (6/94–8/94) Caltech. J. Cohen. Light curve of the supernova 1993J progenitor in M81.

GRANTS

Chandra X-Ray Space Telescope General Observer Grant. (01/23) “Testing the $M_{\text{BH}}-M_{\text{Bulge}}$ Relation with Radio-Selected Low Surface Brightness Galaxies” (Co-I; H. Roberts PI; 24700328)

ALMA Archive Student Support Grant. (08/21) “Resolving the Dense Gas Fraction in OH Megamasers with the ALMA Archive” (PI; support for H. Roberts; SOSPADA-005)

NASA Astrophysics Data Analysis Program Grant. (04/21) “Direct Measurement of the Cosmic Acceleration” (PI; 20-ADAP20-0222)

National Science Foundation (NSF) Grant. (07/19) “Gravity in the Galactic Center: Precise 3D

Stellar Kinematics in the Inner Parsec” (PI; AST 19-08122)

NSF Collaborative Grant. (09/18) “Collaborative Research: Observing the Cosmic Evolution of Neutral Hydrogen.” (Institutional PI; AST 18-14421)

National Radio Astronomy Observatory (NRAO) Student Observing Support Grant. (05/15) “High Velocity Masers in the Galactic Center: A New Probe of General Relativity” (PI; support for A. Truebenbach, ALMA 2013.1.00834.S)

NASA Astrophysics Theory Grant. (12/14) “Real-Time Cosmology with Gaia: Developing the Theory to Use Extragalactic Proper Motions to Make Dynamical Cosmological Tests, to Measure Geometric Distances, and to Detect Primordial Gravitational Waves” (PI; 14-ATP14-0086)

NSF Grant. (09/14) “Real-Time Cosmology: Using Extragalactic Proper Motions to Make Dynamical Cosmological Tests, to Measure Geometric Distances, and to Detect Primordial Gravitational Waves” (PI; AST 14-11605)

Chandra X-Ray Space Telescope General Observer Grant. (08/14) “Massive Black Holes in Water Maser Merging Galaxies” (PI; 16620657)

Chandra X-Ray Space Telescope General Observer Grant. (08/12) “Chandra Confirmation of Candidate Inspiral, Binary, or Recoiling Black Holes in Nearby Galaxies” (PI; 14700608)

NSF Grant. (08/11) “Proper Motion of the Andromeda Galaxy: The Key to Local Group Masses and Dynamics” (PI; AST 11-09078)

Spitzer Space Telescope Grant. (07/11) “A New Technique for Identifying Very Highly-Obscured Quasar Sightlines” (Co-I; J. Stocke PI)

NRAO Student Observing Support Grant. (05/10) “A Targeted Search for OH Megamasers in the COSMOS Field” (PI; support for K. Willett, GBT10B-026)

NRAO Student Observing Support Grant. (05/10) “Densitometry of Young Star-Forming Complexes Throughout the Galaxy” (Co-I; J. Bally PI, support for A. Ginsburg, GBT10B-019)

NRAO Student Observing Support Grant. (10/09) “Searching for Molecular Oxygen, the Hidden Key to Oxygen Chemistry in the ISM” (PI; support for B. Zeiger, GBT09C-046)

NRAO Student Observing Support Grant. (10/09) “Mapping Compact Radio Sources in Non-Elliptical Host Galaxies” (Co-I; J. Stocke PI, support for T. Yan, VLBA09C-130)

NSF Grant. (8/09) “Extragalactic OH Maser Astrophysics: From Andromeda to the Peak of Cosmic Star Formation” (PI; AST 09-08621)

NRAO Student Observing Support Grant. (01/09) “A Spectral Survey of an Opaque Atmospheric Window” (PI; support for B. Zeiger, GBT09A-064)

NASA Lunar Science Institute Grant. (12/08) “Lunar University Node for Astrophysics Research (LUNAR): Exploring the Cosmos from the Moon” (Co-I; J. Burns PI)

Chandra/Hubble Space Telescope Grant. (8/08) “The Structure and Physics of the Youngest Radio Galaxies” (Co-I; E. Perlman PI)

NRAO Student Observing Support Grant. (5/08) “A High Redshift OH Megamaser Survey” (PI; support for K. Willett, GBT08B-035)

Spitzer Space Telescope Grant. (2/08) “Witnessing the Birth of Radio Galaxies: Spitzer Spectroscopy of Nearby Compact Symmetric Objects” (Co-I; J. Stocke PI)

NRAO Student Observing Support Grant. (10/07) “Formaldehyde in the Gravitational Lens PKS 1830-211” (PI; support for B. Zeiger, GBT07C-056)

NSF Grant. (8/07) “Cosmological Changes in Fundamental Constants of Nature” (Co-I; J. Stocke PI; AST 07-07480)

NSF Grant. (7/07) “Formaldehyde: A Unique Probe of Galaxy Evolution and Cosmology” (PI; AST

- Chandra Grant.** (8/06) “Resolving the Nature of PKS 1413+135 and its Absorber” (Co-I; E. Perlman PI)
- Spitzer Space Telescope Grant.** (5/06) “The Astrophysics of OH Megamasers in Merging Galaxies: the Role of Star Formation, Dust, Molecules, and AGN” (PI)
- Spitzer Space Telescope Grant.** (5/06) “Compact Symmetric Objects: A New Class of ‘Buried’ AGN?” (Co-I; J. Stocke PI)

REFEREED PUBLICATIONS¹ *109 Pubs, 11403 Citations, h-index 40, g-index 106, i10-index 93*

- Radio AGN Hosts and Star-Formation Dominated Galaxies in the VLA Sky Survey.** J.-M. Eberhard, A. Reines, H. Gim, *J. Darling*, & J. Greene. 2023, ApJ, submitted
- Where do stars explode in the ISM? – The distribution of dense gas around massive stars and supernova remnants in M33.** S. K. Sarbadhicary, J. Wagner, E. W. Koch, N. Mayker Chen, A. K. Leroy, N. Lahén, E. Rosolowsky, K. F. Neugent, C.-G. Kim, L. Chomiuk, J. J. Dalcanton, L. A. Lopez, N. M. Pingel, R. Indebetouw, T. G. Williams, E. Tarantino, J. Donovan Meyer, E. D. Skillman, A. Smercina, A. A. Kepley, E. J. Murphy, J. Strader, T. Wong, S. Stanimirović, V. Villanueva, F. Walter, J. Ott, *J. Darling*, J. Roman-Duval, & C. E. Murray. 2023, ApJ, submitted (arXiv:2310.17694)
- The FLASH pilot survey: an H I absorption search against MRC 1-Jy radio sources.** J. N. H. S. Aditya, H. Yoon, J. R. Allison, T. An, R. Chhetri, S. J. Curran, *J. Darling*, K. L. Emig, M. Glowacki, E. Kerrison, B. S. Koribalski, E. K. Mahony, V. A. Moss, J. Morgan, E. M. Sadler, R. Soria, R. Su, S. Weng, & M. Whiting. 2023, MNRAS, in press (arXiv:2310.14571)
- Gas-dynamical Mass Measurements of the Supermassive Black Holes in the Early-Type Galaxies NGC 4786 and NGC 5193 from ALMA and HST Observations.** K. M. Kabasares, A. J. Barth, B. D. Boizelle, J. Davidson, J. M. Sy, J. Flores-Velázquez, D. A. Buote, J. L. Walsh, A. J. Baker, *J. Darling*, L. C. Ho, & J. Cohn. 2023, ApJ, submitted
- ALMA gas-dynamical mass measurement of the supermassive black hole in the red nugget relic galaxy PGC 11179.** J. H. Cohn, M. Curliss, J. L. Walsh, K. M. Kabasares, B. D. Boizelle, A. J. Barth, K. Gebhardt, K. Gültekin, A. Yıldırım, D. A. Buote, *J. Darling*, A. J. Baker, & L. C. Ho. 2023, ApJ, 958, 186 (14pp)
- An Updated Reference Frame for the Galactic Inner Parsec.** *J. Darling*, J. Paine, M. J. Reid, K. M. Menten, S. Sakai, & A. Ghez. 2023, ApJ, 955, 117 (14pp)
- The 107 GHz methanol transition is a dasar in G0.253+0.016.** A. Bulatek, A. Ginsburg, *J. Darling*, C. Henkel, & K. M. Menten. 2023, ApJ, 956, 78 (11pp)
- Wandering Black Hole Candidates in Dwarf Galaxies at VLBI Resolution.** A. J. Sargent, M. C. Johnson, A. E. Reines, N. J. Secrest, A. J. van der Horst, P. J. Cigan, *J. Darling*, & J. E. Greene. 2022, ApJ, 933, 160 (13pp)
- Black Hole Mass Measurements of Early-Type Galaxies NGC 1380 and NGC 6861 Through ALMA and HST Observations and Gas-Dynamical Modeling.** K. M. Kabasares, A. J. Barth, D. A. Buote, B. D. Boizelle, J. L. Walsh, A. J. Baker, *J. Darling*, L. C. Ho, & J. Cohn. 2022, ApJ, 934, 162 (27pp)
- The Universe is Brighter in the Direction of Our Motion: Galaxy Counts and Fluxes are Consistent with the CMB Dipole.** *J. Darling*. 2022, ApJ, 931, L14 (8pp)
- Looking at the Distant Universe with the MeerKAT Array: Discovery of a Luminous OH**

¹Underlined names are (or were) Colorado graduate students, undergraduates, or postdocs. Source for citation data is Google Scholar, omitting citations of non-refereed publications.

- Megamaser at $z > 0.5$.** M. Glowacki, J. D. Collier, A. Kazemi-Moridani, B. Frank, H. Roberts, *J. Darling*, H.-R. Klöckner, N. Adams, A. J. Baker, M. Bershad, T. Blecher, S.-L. Blyth, R. Bowler, B. Catinella, L. Chemin, S. M. Crawford, C. Cress, R. Davé, R. Deane, E. de Blok, J. Delhaize, K. Duncan, E. Elson, S. February, E. Gawiser, P. Hatfield, J. Healy, P. Henning, K. M. Hess, I. Heywood, B. W. Holwerda, M. Hoosain, J. P. Hughes, Z. L. Hutchens, M. Jarvis, S. Kannappan, N. Katz, D. Kereš, M. Korsaga, R. C. Kraan-Korteweg, P. Lah, M. Lochner, N. Maddox, S. Makhathini, G. R. Meurer, M. Meyer, D. Obreschkow, S.-H. Oh, T. Oosterloo, J. Oppor, H. Pan, D. J. Pisano, N. Randriamiarinarivo, S. Ravindranath, A. C. Schröder, R. Skelton, O. Smirnov, M. Smith, R. S. Somerville, R. Srianand, L. Staveley-Smith, M. Tanaka, M. Vaccari, W. van Driel, M. Verheijen, F. Walter, J. F. Wu, & M. A. Zwaan. 2022, *ApJ*, 931, L7 (8pp)
- The Seventeenth Data Release of the Sloan Digital Sky Surveys: Complete Release of MaNGA, MaStar and APOGEE-2 Data.** Abdurro'uf, K. Accetta, C. Aerts, et al. (340 alphabetical coauthors). 2022, *ApJS*, 259, 35 (40pp)
- 3D Kinematics of Stellar SiO Masers in the Galactic Center.** J. Paine & *J. Darling*. 2022, *ApJ*, 927, 181 (14pp)
- Unveiling the Universe with Emerging Cosmological Probes.** M. Moresco, L. Amati, L. Amendola, S. Birrer, J. P. Blakeslee, M. Cantiello, A. Cimatti, *J. Darling*, M. Della Valle, M. Fishbach, C. Grillo, N. Hamaus, D. Holz, L. Izzo, R. Jimenez, E. Lusso, M. Meneghetti, E. Piedipalumbo, A. Pisani, A. Poursidou, L. Pozzetti, M. Quartin, G. Risaliti, P. Rosati, & L. Verde. 2022, *Living Reviews in Relativity*, 25, 6 (234pp)
- Towards Robust Constraints on Axion Dark Matter using PSR J1745–2900.** R. A. Battye, *J. Darling*, J. McDonald, & S. Srinivasan. 2022, *Phys. Rev. D*, 105, L021305 (5pp)
- The First Large Absorption Survey in HI (FLASH): I. Science Goals and Survey Design.** J. R. Allison, E. M. Sadler, A. D. Amaral, T. An, S. J. Curran, *J. Darling*, A. C. Edge, S. L. Ellison, K. L. Emig, B. M. Gaensler, L. Garratt-Smithson, M. Glowacki, K. Grasha, B. S. Koribalski, C. del P. Lagos, P. Lah, E. K. Mahony, S. A. Mao, R. Morganti, V. A. Moss, M. Pettini, K. A. Pimblet, C. Power, P. Salas, L. Staveley-Smith, M. T. Whiting, O. I. Wong, H. Yoon, Z. Zheng, & M. A. Zwaan. 2022, *PASA*, 39, 10 (31pp)
- An ALMA Gas-dynamical Mass Measurement of the Supermassive Black Hole in the Local Compact Galaxy UGC 2698.** J. H. Cohn, J. L. Walsh, B. D. Boizelle, A. J. Barth, K. Gebhardt, K. Gültekin, A. Yıldırım, D. A. Buote, *J. Darling*, A. J. Baker, L. C. Ho, & K. M. Kabasares. 2021, *ApJ*, 919, 77 (18pp)
- The Galaxy Evolution Probe.** J. Glenn, C. Bradford, E. Rosolowsky, R. Amini, K. Alatalo, L. Armus, A. Benson, T.-C. Chang, *J. Darling*, P. Day, J. Domber, D. Farrah, B. Hensley, S. Lipsy, B. Moore, S. Oliver, J. Perido, D. Redding, M. Rodgers, R. Shirley, H. Smith, J. Steeves, C. Tucker, & J. Zmuidzinas. 2021, *JATIS*, 7, 034004 (36pp)
- Faint Objects in Motion: The New Frontier of High Precision Astrometry.** F. Malbet, C. Boehm, A. Krone-Martins, et al. (and 83 alphabetical coauthors). 2021, *Experimental Astronomy*, 51, 845 (42pp)
- Gaia EDR3 Parallax Distances to the Great Carina Nebula and Its Star Clusters (Trumpler 14, 15, 16).** J. M. Shull, *J. Darling*, & C. W. Danforth. 2021, *ApJ*, 914, 18 (12pp)
- OH Megamasers in HI Surveys: Forecasts and a Machine Learning Approach to Separating Disks from Mergers.** H. Roberts, *J. Darling*, & A. J. Baker. 2021, *ApJ*, 911, 38 (14pp)
- Outflows, Shocks and Coronal Line Emission in a Radio-Selected AGN in a Dwarf Galaxy.** M. Molina, A. E. Reines, J. E. Greene, *J. Darling*, & J. J. Condon. 2021, *ApJ*, 910, 5 (17pp)
- Apertif view of the OH Megamaser IRAS 10597+5926: OH 18 cm satellite lines in wide-area HI surveys.** K. M. Hess, H. Roberts, H. Dénes, B. Adebahr, *J. Darling*, E. A. K. Adams, W. J. G. de Blok, A. Kutkin, D. M. Lucero, Raffaella Morganti, V. A. Moss, T. A. Oosterloo, R. Schulz, J. M. van

- der Hulst, A. H. W. M. Coolen¹, S. Damstra, M. Ivashina, G. Marcel Loose, Yogesh Maan, Á. Mika, H. Mulder, M. J. Norden, L. C. Oostrum, M. Ruitter, Joeri van Leeuwen, N. J. Vermaas, D. Vohl, S. J. Wijnholds, & J. Ziemke. 2021, *A&A*, 647, A193 (9pp)
- Black Hole Mass Measurements of Radio Galaxies NGC 315 and NGC 4261 Using ALMA CO Observations.** B. D. Boizelle, J. L. Walsh, A. J. Barth, D. A. Buote, A. J. Baker, *J. Darling*, L. C. Ho, J. Cohn, & K. M. Kabasares. 2021, *ApJ*, 908, 19 (24pp)
- New Limits on Axionic Dark Matter from the Magnetar PSR J1745–2900.** *J. Darling*. 2020, *ApJ*, 900, L28 (13pp)
- Search for Axionic Dark Matter Using the Magnetar PSR J1745–2900.** *J. Darling*. 2020, *Phys. Rev. Lett.*, 125, 121103 (11pp)
- The Evolution of Neutral Hydrogen Over the Past 11 Gyr via HI 21 cm Absorption.** *K. Grasha*, *J. Darling*, A. K. Leroy, & A. D. Bolatto. 2020, *MNRAS*, 498, 883 (21pp)
- Secular Extragalactic Parallax: Measurement Methods and Predictions for Gaia** *J. Paine*, *J. Darling*, R. Graziani, & H. M. Courtois. 2020, *ApJ*, 890, 146 (24pp)
- A New Sample of (Wandering) Massive Black Holes in Dwarf Galaxies from High Resolution Radio Observations.** A. Reines, J. Condon, *J. Darling*, & J. Greene. 2020, *ApJ*, 888, 36 (18pp)
- FLASH Early Science – Discovery of an intervening HI 21-cm absorber from an ASKAP survey of the GAMA 23 field.** J. R. Allison, E. M. Sadler, L. J. Davies, S. P. Driver, S. L. Ellison, M. Huynh, A. D. Kapińska, E. K. Mahony, V. A. Moss, M. T. Whiting, S. J. Curran, *J. Darling*, B. S. Koribalski, C. D. P. Lagos, M. Pettini, K. A. Pimblet, & M. A. Voronkov. 2019, *MNRAS*, 494, 3627 (15pp)
- The 16th Data Release of the Sloan Digital Sky Surveys: First Release from APOGEE-2 Southern Survey and Full Release of eBOSS Spectra.** R. Ahumada, C. Allende Prieto, A. Almeida, et al. (308 alphabetical coauthors). 2020, *ApJS*, 249, 3 (25pp)
- Sardinia Radio Telescope Observations of Local Group Dwarf Galaxies: I. The Cases of NGC 6822, IC 1613, and WLM.** A. Tarchi, P. Castangia, G. Surcis, A. Brunthaler, C. Henkel, M. Pawlowski, K. Menten, A. Melis, S. Casu, M. Murgia, A. Trois, R. Concu, & *J. Darling*. 2019, *MNRAS*, 492, 45 (15pp)
- A Search for Intrinsic HI 21 cm and OH 18 cm Absorption Toward Compact Radio Sources.** *K. Grasha*, *J. Darling*, A. Bolatto, A. Leroy, & J. Stocke. 2019, *ApJS*, 245, 3 (28pp)
- A Precision Measurement of the Mass of the Black Hole in NGC 3258 from High-Resolution ALMA Observations of its Circumnuclear Disk.** B. D. Boizelle, A. J. Barth, J. L. Walsh, D. A. Buote, A. J. Baker, *J. Darling*, & L. C. Ho. 2019, *ApJ*, 881, 10 (32pp)
- The Fifteenth Data Release of the Sloan Digital Sky Surveys: First Release of MaNGA-derived Quantities, Data Visualization Tools, and Stellar Library.** D. S. Aguado, R. Ahumada, A. Almeida, et al. (233 alphabetical coauthors). 2019, *ApJS*, 240, 23 (25pp)
- Toward a Measurement of the Transverse Peculiar Velocity of Galaxy Pairs.** *A. E. Truebenbach* & *J. Darling*. 2018, *ApJ*, 868, 69 (9pp)
- The CO Luminosity Density at High-z (COLDz) Survey: A Sensitive, Large-area Blind Search for Low-J CO Emission from Cold Gas in the Early Universe with the Karl G. Jansky Very Large Array.** R. Pavesi, C. E. Sharon, D. A. Riechers, J. A. Hodge, R. Decarli, F. Walter, C. L. Carilli, E. Daddi, I. Smail, M. Dickinson, R. J. Ivison, M. Sargent, E. da Cunha, M. Aravena, *J. Darling*, V. Smolčić, N. Z. Scoville, P. L. Capak, & J. Wagg. 2018, *ApJ*, 864, 49 (52pp)
- All Transverse Motion Is Peculiar: Connecting the Proper Motions of Galaxies to the Matter Power Spectrum.** *J. Darling* & *A. E. Truebenbach*. 2018, *ApJ*, 864, 37 (10pp)
- The Gaia-WISE Extragalactic Astrometric Catalog.** *J. Paine*, *J. Darling*, & *A. Truebenbach*. 2018, *ApJS*, 236, 37 (9pp)

- The Dual Role of Starbursts and Active Galactic Nuclei in Driving Extreme Molecular Outflows.** A. Gowardhan, H. Spoon, D. A. Riechers, E. González-Alfonso, D. Farrah, J. Fischer, *J. Darling*, C. Fergulio, J. Afonso, & L. Bizzocchi. 2018, *ApJ*, 859, 35 (23pp)
- Astrometric Limits on the Stochastic Gravitational Wave Background.** *J. Darling*, A. E. Truebenbach, & J. Paine. 2018, *ApJ*, 861, 113 (12pp)
- The Fourteenth Data Release of the Sloan Digital Sky Survey: First Spectroscopic Data from the Extended Baryon Oscillation Spectroscopic Survey and from the Second Phase of the Apache Point Observatory Galactic Evolution Experiment.** B. Abolfathi, D. S. Aguado, G. Aguilar, et al. 2018, *ApJ*, 235, 42 (19pp)
- Distributed Star Formation Throughout the Galactic Center Cloud Sgr B2.** A. Ginsburg, J. Bally, A. Barnes, N. Bastian, C. Battersby, H. Beuther, C. Brogan, Y. Contreras, J. Corby, *J. Darling*, C. De Pree, R. Galván-Madrid, G. Garay, J. Henshaw, T. Hunter, J. M. D. Kruijssen, S. Longmore, X. Lu, F. Meng, E. A.C. Mills, J. Ott, J. E. Pineda, Á. Sánchez-Monge, P. Schilke, A. Schmiedeke, D. Walker, & D. Wilner. 2018, *ApJ*, 853, 171 (28pp).
- The 13th Data Release of the Sloan Digital Sky Survey: First Spectroscopic Data from the SDSS-IV Survey Mapping Nearby Galaxies at Apache Point Observatory.** F. D. Albareti, P. Allende, A. Carlos, et al. (344 alphabetical coauthors). 2017, *ApJS*, 233, 25 (25pp)
- The VLBA Extragalactic Proper Motion Catalog and a Measurement of the Secular Aberration Drift.** A. E. Truebenbach & *J. Darling*. 2017, *ApJS*, 233, 3 (16pp)
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ABSTRACTS

- Is the Rest Frame of the Universe Universal?** *J. Darling*. 2023, “New Eyes on the Universe: SKA and ngVLA” meeting in Vancouver, BC, Canada
- Kinematics in the Galactic Center with SiO masers.** *J. Paine* & *J. Darling*. 2023, American Astronomical Society (AAS) Meeting Abstracts, 55, 2, 220.02
- The Past, Present, and Groundbreaking Future of OH Megamaser Discoveries.** *H. Roberts* & *J. Darling*. 2023, AAS Meeting Abstracts, 55, 2, 122.02
- Constraining the Impact of Circumnuclear Disk Warping on Black Hole Mass Measurements With ALMA CO Imaging.** B. Boizelle, M. Laker, A. Barth, J. Walsh, J. Cohn, K. Kabasares, M. Curliss, D. Buote, *J. Darling*, A. Baker, & L. Ho. 2023, AAS Meeting Abstracts, 55, 2, 351.04
- A Molecular Gas-Dynamical Mass Measurement of the Supermassive Black Hole in Early-Type Galaxy ESO 208-G21 Through ALMA CO (2-1) and HST Observations.** K. Kabasares, A. Barth, D. Buote, B. Boizelle, J. Walsh, A. Baker, *J. Darling*, L. Ho, & J. Cohn. 2023, AAS Meeting Abstracts, 55, 2, 258.05
- Mapping Dust Attenuation in Luminous Early-Type Galaxies.** J. Davidson, B. Boizelle, A. Baker, A. Barth, D. Buote, *J. Darling*, L. Ho, J. Walsh, J. Cohn, & K. Kabasares. 2023, AAS Meeting Abstracts, 55, 2, 270.02

- Molecular Line Search in Archival ALMA Imaging of M87.** X. Li, B. Boizelle, A. Barth, J. Walsh, & *J. Darling*. 2022, AAS Meeting 240, #105.12
- Modeling Warped Disk Structures in Galaxy Nuclei using ALMA Observations.** M. Laker, B. Boizelle, J. Cohn, J. Walsh, A. Barth, D. Buote, & *J. Darling*. 2022, AAS Meeting 240, #243.04
- Black Hole Mass Estimates of Early-Type Galaxies NGC 4786, NGC 5193, and NGC 3245 Using ALMA CO Observations and Gas-Dynamical Models.** K. Kabasares, A. Barth, D. Buote, B. Boizelle, J. Walsh, A. Baker, *J. Darling*, L. Ho, J. Cohn, J. Sy, & J. Flores-Velázquez. 2022, AAS Meeting 240, #343.01
- A luminous OH megamaser at $z > 0.5$.** A. Kazemi-Moridani, M. Glowacki, J. Collier, B. Frank, H. Roberts, *J. Darling*, H.-R. Kloeckner, & Laduma Collaboration. 2022, AAS Meeting 240, #412.06
- Cosmology with the Secular Redshift Drift.** *J. Darling*. 2021, “Non-Standard Cosmological Probes” session at the Sixteenth Marcel Grossmann meeting (virtual)
- Black Hole Mass Measurements of Radio Galaxies NGC 315 and NGC 4261 Using ALMA CO Observations.** B. D. Boizelle, J. L. Walsh, A. J. Barth, D. A. Buote, A. J. Baker, *J. Darling*, L. C. Ho, J. Cohn, & K. M. Kabasares. 2021, AAS Meeting 237, #427.03
- New Constraints on Axionic Dark Matter from Spectra of the Galactic Center Magnetar.** *J. Darling*. 2021, AAS Meeting 237, #425.02
- 3D Kinematics of SiO Masers in the Central Parsec of the Galactic Center.** J. Paine & *J. Darling*. 2021, AAS Meeting 237, #343.02
- Identification of OH Megamasers in Untargeted HI Surveys using Machine Learning.** H. Roberts, *J. Darling*, A. J. Baker, K. M. Hess, & Apertif Team. 2021, AAS Meeting 237, #235.05
- The Extragalactic Proper Motion of the Acoustic Scale.** R. Bowyer & *J. Darling*. 2021, AAS Meeting 237, #525.07
- Gas-Dynamical Mass Measurement of the Supermassive Black Hole in the Local Compact Galaxy UGC 2698.** J. Cohn, J. Walsh, B. Boizelle, A. Barth, K. Gebhardt, K. Gültekin, A. Yıldırım, *J. Darling*, A. Baker, L. Ho, D. Buote, & K. Kabasares. 2021, AAS Meeting 237, #427.04
- Measurement of the Black Hole Mass in NGC 4786 from ALMA CO(2-1) Observations.** J. M. Sy, K. Kabasares, A. J. Barth, L. C. Ho, B. D. Boizelle, J. L. Walsh, J. Cohn, *J. Darling*, & A. J. Baker. 2021, AAS Meeting 237, #539.04
- Wandering Massive Black Holes in Dwarf Galaxies.** A. Reines, J. Condon, *J. Darling*, & J. Greene. 2020, AAS Meeting 235, #344.05
- Secular Extragalactic Parallax: Measurement Methods and Predictions for Gaia.** J. Paine, *J. Darling*, R. Graziani, & H. Courtois. 2020, AAS Meeting 235, #279.08
- Measurements of the Black Hole Masses in NGC 1380 and NGC 6861 from ALMA CO(2-1) Observations.** K. M. Kabasares, A. J. Barth, D. Buote, B. Boizelle, J. Walsh, L. Ho, *J. Darling*, & A. Baker. 2020, AAS Meeting 235, #213.03
- OH Megamasers: Unintended Discoveries (or Contaminants) in Untargeted HI Line Surveys.** H. Roberts, *J. Darling*, A. Baker, & S. Kannappan. 2020, AAS Meeting 235, #207.30
- Cosmological and Extragalactic Science Cases for Incompatible Versions of the ngVLA.** *J. Darling*. 2019, Radio/Millimeter Astrophysical Frontiers in the Next Decade, Charlottesville, VA
- An Astrometric Approach to Gravitational Waves and Cosmology.** *J. Darling*. 2019, The Space Astrophysics Landscape for the 2020s and Beyond, Potomac, MD
- A Radio Search for Massive Black Holes in Dwarf Galaxies.** A. Reines, J. Condon, *J. Darling*, & J. Greene. 2019, AAS Meeting 233, #134.02
- ngVLA Key Science Goal 5 Understanding the Formation and Evolution of Black Holes in the Era of Multi-Messenger Astronomy.** T. J. W. Lazio, K. Alatalo, L. Blecha, et al. (53 coauthors).

- 2019, AAS Meeting 233, #361.25
- New Astrometric Limits on the Stochastic Gravitational Wave Background.** *J. Darling, A. E. Truebenbach, & J. Paine.* 2018, AAS Meeting 232, #324.07
- Secular Extragalactic Parallax and Geometric Distances with Gaia Proper Motions.** *J. Paine & J. Darling.* 2018, AAS Meeting 232, #319.01
- Real-Time Cosmology with Extragalactic Proper Motions: the Secular Aberration Drift and Evolution of Large-Scale Structure.** *A. Truebenbach & J. Darling.* 2018, AAS Meeting 231, #430.03
- A Catalog of Proper Motions to Dynamically Measure the Hubble Expansion and the Evolution of Large-Scale Structure.** *A. E. Truebenbach & J. Darling.* 2017, AAS Meeting 229, #246.01
- Circumnuclear Disks in Early-type Galaxies: 12CO(2-1) and Continuum Properties.** *B. Boizelle, A. J. Barth, A. J. Baker, J. Darling, L. Ho, J. Walsh, & D. A. Buote.* 2017, AAS Meeting 229, #114.06
- Measurement of the Black Hole Mas in NGC 1332 with ALMA CO Observations.** *A. J. Barth, B. Boizelle, J. Darling, A. J. Baker, D. A. Buote, L. C. Ho, & J. Walsh.* 2016, AAS Meeting 228, #103.05
- Intensity Mapping of Molecular Gas at High Redshift.** *G. Bower, G. Keating, D. Marrone, D. De-Boer, T.-C. Chang, M.-T. Chen, H. Jiang, P. Koch, D. Kubo, C.-T. Li, K. Y. Lin, R. Srinivasan, & J. Darling.* 2015, IAU General Assembly, Meeting #29, #2250511.
- The Hubble Expansion is Isotropic in the Epoch of Dark Energy.** *J. Darling.* 2015, AAS Meeting 225, #255.10
- A Method for Measuring the Transverse Velocity Vector and the Geometric Distance of the Andromeda Galaxy Using Water Masers.** *N. Amiri & J. Darling.* 2015, AAS Meeting 225, #446.01
- Identifying OH Imposters in the ALFALFA HI Survey.** *K. Suess, J. Darling, M. P. Haynes, & R. Giovanelli.* 2015, AAS Meeting 225, #143.25
- A Multi-Wavelength Study of Water Maser-Emitting Regions in the Andromeda Galaxy.** *N. Amiri, J. Darling, & B. Gerard.* 2014, AAS Meeting 223, #454.40
- Molecular Gas in the Andromeda Galaxy.** *B. Gerard, J. Darling, & N. Amiri.* 2014, AAS Meeting 223, #454.03
- Imaging the Spatial Density Within Starburst Galaxies M82 and Arp220.** *N. S. Kern, J. G. Mangum, J. Darling, C. Henkel, & K. Menten.* 2014, AAS Meeting 223, #252.02
- Real-Time Cosmology.** *J. Darling.* 2013, 25th Kavli Frontiers of Science Symposium, National Academy of Sciences, Irvine, CA
- Toward a Direct Measurement of the Cosmic Acceleration.** *J. Darling.* 2013, Thirty Meter Telescope Science Forum, Waikoloa, HI
- Molecular Gas in the Andromeda Galaxy.** *B. Gerard, J. Darling, & Nikta Amiri.* 2013, Bulletin of the American Physical Society, 58, 12, 4CF.G1.17
- Toward a Direct Measurement of the Cosmic Acceleration.** *J. Darling.* 2013, AAS Meeting 221, #341.06
- HI Emission in Nearby X-ray Detected Active Galaxies.** *E. George, L. M. Winter, B. Zauderer, J. Darling, & M. Koss.* 2013, AAS Meeting 221, #339.37
- Imaging the Spatial Density Within Starburst Galaxies.** *R. Smullen, J. G. Mangum, J. Darling, C. Henkel, & K. Menten.* 2013, AAS Meeting 221, #157.07
- Active Galaxy Host Properties from a New H I 21-cm Survey of the Swift BAT-detected AGN.** *L. M. Winter, E. R. George, B. Zauderer, & J. Darling.* 2013, AAS Meeting 221, #307.04

- Water Masers in the Andromeda Galaxy: The Path to Geometric Distance and Proper Motion.** *J. Darling.* 2012, “The Great Andromeda Galaxy” meeting, Princeton, NJ
- Water Masers in the Andromeda Galaxy: The First Step Toward Proper Motion.** *J. Darling.* 2012, AAS Meeting 219, #346.13
- Investigating the Black Hole - Dark Matter Halo Connection in a New Sample of Local Active Galactic Nuclei.** *J. Mirocha, J. Darling, M. Haynes, & R. Giovanelli.* 2012, AAS Meeting 219, #243.25
- Galaxy Motions with Radio Astrometry.** *A. Brunthaler, M. Reid, K. Menten, G. Bower, J. Darling, H. Falcke, M. Garrett, C. Henkel, A. Loeb, L. Loinard, T. Oosterloo, E. Roediger, L. Sjouwerman, A. Tarchi, & J. van Gorkom.* 2011, “Building on New Worlds, New Horizons: New Science from Sub-millimeter to Meter Wavelengths” meeting, Santa Fe, NM
- A Search for Intrinsic HI 21-cm Absorption Toward Compact Radio Sources.** *K. Grasha & J. Darling.* 2011, AAS Meeting 217, #345.02
- The Formaldehyde Deep Field: A Mass-Limited, Distance-Independent, Extinction-Free Census of Cosmic Star Formation.** *J. Darling & B. Zeiger.* 2011, AAS Meeting 217, #335.10
- Formaldehyde Densitometry of Dust Clumps: The Shapes and Densities of Massive Star Forming Regions.** *A. Ginsburg, C. Battersby, J. Darling, & J. Bally.* 2011, AAS Meeting 217, #258.03
- Physical Molecular Probes of Star-Forming Galaxies.** *J. Darling.* 2010, “Stormy Cosmos: The Evolving ISM from Spitzer to Herschel and Beyond” meeting, Pasadena, CA
- Frustrated by RFI: Present-Day Molecular Astrophysics at High Redshift.** *K. Willett & J. Darling.* 2010, “Robotic Science From the Moon” meeting, Boulder, CO
- The Search for Intrinsic and Intervening HI Absorption at High Redshift Toward Compact Radio Sources.** *K. Grasha & J. Darling.* 2010, “Robotic Science From the Moon” meeting, Boulder, CO
- The ALFALFA HI Absorption Survey.** *E. Macdonald, J. Darling, & the ALFALFA Team.* 2010, Royal Astronomical Society National Astronomy Meeting, Glasgow, UK
- Detection of Three Redshifted HI Absorption Systems.** *T. Yan, J. Stocke, & J. Darling.* 2010, AAS Meeting 215, #460.07
- Formaldehyde Absorption of the Cosmic Microwave Background: A Distance-Independent Tracer of Dense Molecular Gas.** *B. Zeiger & J. Darling.* 2010, AAS Meeting 215, #415.04
- Galactic Analog Water Masers in the Antennae Galaxies.** *C. Brogan, K. Johnson, & J. Darling.* 2010, AAS Meeting 215, #320.04
- Mid-Infrared Spectroscopy of Compact Symmetric Objects.** *K. Willett, J. Stocke, E. Perlman, & J. Darling.* 2009, “Reionization to Exoplanets: Spitzer’s Growing Legacy,” Pasadena, CA
- Formaldehyde Densitometry of Starburst Galaxies.** *J. G. Mangum, J. Darling, B. R. Zeiger, K. M. Menten, & C. Henkel.* 2009, IRAM 30m 30th Anniversary Meeting
- The ALFALFA HI Absorption Pilot Project.** *E. Macdonald, J. Darling, & the ALFALFA Team.* 2009, AAS Meeting 213, #482.09
- The Discovery of Water Masers in Nearby Star-Forming Galaxies.** *J. Darling, C. Brogan, & K. Johnson.* 2009, AAS Meeting 213, #445.01
- Observing High Redshift Starbursts With Formaldehyde.** *B. Zeiger & J. Darling.* 2008, “The EVLA Vision: Galaxies Through Cosmic Time” NRAO, Socorro, NM
- Mid-Infrared Spectroscopy of OH Megamasers.** *K. Willett, J. Darling, L. Armus, V. Charmandaris, H. Spoon, & Y. Pihlström.* 2007, AAS Meeting 211, #141.05
- A Dense Gas Trigger for OH Megamasers.** *J. Darling.* 2007, AAS Meeting 211, #141.04

- Formaldehyde Absorption Toward the Gravitational Lens B0218+357 at $z=0.68$.** *J. Darling & T. Wiklind.* 2005, AAS Meeting 207, #203.01
- Molecular Tori in AGN: A Search Using Excited States of OH.** C. M. V. Impellizzeri, A. L. Roy, C. Henkel, *J. Darling*, & J. A. Braatz. 2005, *Astron. Nachr.*, 326, 544
- The Broad OH Megamaser Lines in Ultra Luminous Infrared Galaxies.** Y. M. Pihlström, J. E. Conway, & *J. Darling.* 2004, AAS Meeting 205, #26.09
- OH Maser Disks and Outflows in ULIRGs: VLBA Observations of two IRAS Galaxies.** Y. M. Pihlström, W. A. Baan, *J. Darling*, & H.-R. Klöckner. 2003, AAS Meeting 203, #146.02
- OH Megamasers in External Galaxies.** *J. Darling.* 2003, *The Astrochemistry of External Galaxies*, IAU 25, JD 21
- The Green Bank Telescope OH Megamaser Survey.** B. Kent, J. Braatz, & *J. Darling.* 2002, AAS Meeting 201, #52.16
- The Arecibo OH Megamaser Survey.** *J. Darling.* 2001, AAS Meeting 199, #35.05
- Observing OH Megamasers with the Upgraded Arecibo Telescope.** *J. Darling & R. Giovanelli.* 2001, AAS Meeting 198, #89.03
- OH Megamasers: Luminous Radio Beacons of Merging Galaxies.** *J. Darling & R. Giovanelli.* 2001, AAS Meeting 198, #34.05
- A Survey of Lyman Break Galaxies Associated with Damped Lyman Alpha Systems at $z \sim 3$.** J. Cooke, A. M. Wolfe, E. Gawiser, J. X. Prochaska, & *J. Darling.* AAS Meeting 198, #54.10 (2001)
- The Arecibo OH Megamaser Survey and the Galaxy Merger Rate.** *J. Darling*, and R. Giovanelli. 2000, AAS Meeting 196, #51.01
- Optical/Infrared Site Survey in the High Atacama Desert.** R. Giovanelli, *J. Darling*, M. Sarazin, S. Eikenberry, B. Hoffman, M. Swain, J. Yu, P. M. Harvey, A. Otarola, and G. Valladares. AAS Meeting 193, #11.02 (1999)
- High-Redshift Quasars and Other Peculiar-Color Objects in DPOSS.** S. G. Djorgovski, S. C. Odewahn, R. R. Gal, R. R. De Carvalho, A. Kelly, J. Kollmeier, E. Kartalov, *J. Darling*, and V. Desai. AAS 192, #55.22 (1998)
- Galaxy Companions of Quasars at $z > 4$: Formation of Protocluster Cores?.** S. G. Djorgovski, K. R. Banas, S. C. Odewahn, R. R. Gal, M. A. Pahre, R. R. de Carvalho, V. Desai, & *J. Darling.* 1997, *BAAS*, 191, #95.07
- Discovery of 6 Bright Quasars at $z > 4$ From Digitized POSS-II.** *J. Darling*, R. R. de Carvalho, J. Kennefick, & S. G. Djorgovski. 1995, *BAAS*, 187, #84.17

TEACHING

- Introduction to Scientific Data Analysis and Computing.** University of Colorado, ASTR 3800, 3 credit hours, 21–24 students, Fall 2020, 2022
- Internal Processes in Gases/Atomic and Molecular Processes.** University of Colorado, ASTR 5110, 3–4 credit hours, 8–14 students, Fall 2007, 2008, 2009, 2012, 2015, 2016, 2018, 2019, 2021
- Relativity and Cosmology.** University of Colorado, ASTR 3740, 3 credit hours, 19–48 students, Spring 2008, Spring 2010, Spring 2011, Spring 2012, Spring 2013, Spring 2015, Spring 2018
- Black Holes.** University of Colorado, ASTR 2030, 3 credit hours, 120 students, Fall 2014
- Computational Techniques.** University of Colorado, ASTR 2600, 3 credit hours, 20–30 students, Fall 2015, Spring 2017, Fall 2017, Fall 2018, Fall 2019
- General Astronomy: Stars and Galaxies.** University of Colorado, ASTR 1120/1200, 3 credit hours, 100–202 students, Spring 2009, Fall 2010, Fall 2011

Synthesis Imaging Mini Summer School. University of Colorado, Summer 2019

Independent Study. University of Colorado, ASTR 2840, 3 credit hours, 1 student, Spring 2011 (not listed as instructor of record)

Astronomical Spectroscopy. University of Colorado, ASTR 3520, 4 credit hours, 16 students, Fall 2006 (assisting J. Bally)

Senior Practicum. University of Colorado, ASTR 4020, 3 credit hours, 2 students, Fall 2006

Galaxies and Cosmology. University of Southern California, Astronomy 420, 3 credit hours, 12 students, Spring 2003 (co-taught with P. Martini)

MENTORING

Faculty Mentor. Zachory Berta-Thompson (2016–), Meredith MacGregor (2020–2022).

Postdoctoral Research Advisor. Nikta Amiri (2012–2015), Emily Griffith (2022–).

PhD Dissertation Advisor. Kyle Willett (2006–2011; 2011 PhD). Alexandra Truebenbach (2014–2018; 2018 PhD). Jennie Paine (2018–2023). Hayley Roberts (2019–2023).

Candidacy Research Advisor. Comprehensive Exam research advisor for graduate students Kyle Willett (2007), Benjamin Zeiger (2008), Jordan Mirocha (2011), Alexandra Truebenbach (2014), Jennie Paine (2018), Rachel Bowyer (2020), Anna Estes (2022–2023).

Graduate Research Mentor. Employed graduate students Anthony Smith (Fall 2009), Amandeep Gill (Fall 2010–Spring 2011), Jen Kulow (Spring 2012–Fall 2012). Rachel Bowyer (Summer 2019–2021). Anna Estes (Fall 2021–2023).

Informal Research Mentor. Collaborative research with graduate students Adam Ginsburg (2009–2013), Cara Battersby (2009–2013), Benjamin Zeiger (2007–2012), Ting Yan (2008–2013), Nicole Arulanantham (2019–2020).

PhD Thesis Committees. A. Bender, K. Heng, F. Hearty, L. Earle, B. Keeney, A. Ginsburg, T. Yan, K. Willett, C. Battersby, B. Zeiger, J. Henning, J. Kamenetski, A. Youngblood, J. Mirocha, W. Everett, G. Salveson, A. Harness, B. Nevin, E. Zetterlund, N. Arulanantham, A. Stemo, N. Kruczek, S. Johnson, J. Negus, A. Lattimer, B. Rumberger, A. Schechter, E. Fair, T. Akiba.

Candidacy Exam Impartial Chair. PhD qualifying exam impartial chair for C. Battersby, M. Chaffin, A. Ginsburg, J. Khargharia, J. Kamenetzky, S. Kohler, B. Nhan, S. Skillman, E. Tilton, B. Holler, A. Schiff, A. Stemo, R. Hofmann, J. Negus, B. Alden, N. Kulkarni, A. Schechter, J. Hibbard.

Candidacy Exam Committees. PhD qualifying exam committee member for A. Dove, J. Henning, J. Lovering, K. O’Malia, P. Robinson, T. Yan, E. Zekis, W. Everett, D. Schenck, A. Youngblood, C. Heath, B. Nevin, N. Kruczek, S. van Kooten, E. Anders, C. Gilbert, N. Arulanantham, R. Diaz-Perez, A. Lattimer, K. Sorli, T. Akiba, T. Bishop, J. Chittidi, C. Echiburu, P. Wachiraphan, K. Burton.

Undergraduate Honors Thesis Mentor. Erin Macdonald (2007–2009; subsequent PhD in physics at U. Glasgow), Benjamin Gerard (Summer 2012–2014; PhD at U. Victoria), Erin George (2013–2014; in PhD program at UCSD), Katherine Suess (physics, 2013–2015; in PhD program at UC Berkeley), Allyssa Riley (2015; employed at STScI), Samantha Valenteen (2015–2016; U. Washington), Junyu Chen (2021–2022).

Undergraduate Research Mentor. Employed undergraduate students Kathryn Grasha (Summer 2009–2011; U Mass PhD), Srikar Appana (Summer 2010–Fall 2010), Kelsey Lawrence (Fall 2011–Spring 2012; renewable energy), Kirsten Pedersen (Summer 2012; education), Samantha Valenteen (Spring 2016), Katherine Pellicore (Summer 2015), Megan Maguire (Summer & Fall 2016; physics engineering), Andréia Ribeiro De Noronha Sales (Summer 2017), Sarah Stasiorowski (Summer 2017–Summer 2018), Alexander Koek (Fall 2018), Gustavo Santaella (Fall 2019), Junyu Chen (Summer 2020–Spring 2022), Anna Nica (Summer 2021–Spring 2022).

Undergraduate Astronomy and Astrophysics Majors Mentor. (2009–)

High School Student Mentor. Weekly meetings with Cole Hugelmeyer (Spring 2011). Science project mentor for Andrew Dewey (Fall 2011 – Spring 2012). Research Science Institute mentor for Daniel Thai (Summer 2004).

John S. Knight Writing Program Teaching Assistant. Cornell, Astro 201: “Our Home in the Universe,” Fall 1997, Fall 1998; Astro 202: “Our Home in the Solar System,” Spring 1998, Spring 1999

Teaching Assistant. Cornell, Astro 102/104: “Our Solar System,” Spring 1997

SURF Program Peer Coach. Caltech, Summer–Fall 1995.

SELECTED TALKS

Is the Rest Frame of the Universe Universal? (5/23) Contributed talk for “New Eyes on the Universe: SKA and ngVLA” meeting, Vancouver, BC

The Universe is Brighter in the Direction of Our Motion. (9/22) Contributed talk for “The VLA Sky Survey in the Multiwavelength Spotlight” meeting (virtual)

Cosmology with the Secular Redshift Drift. (7/21) Invited talk, “Non-Standard Cosmological Probes” session at the Sixteenth Marcel Grossmann meeting (virtual)

Cosmological and Extragalactic Science Cases for Incompatible Versions of the ngVLA. (6/19) Invited talk, Radio/Millimeter Astrophysical Frontiers in the Next Decade, UVA, Charlottesville, VA

Real-Time Cosmology Colloquium, Universidade Cidade de São Paulo (10/22), Fermilab Cosmic Physics Center (8/21), University of Colorado (12/19), University of New Mexico (11/19), NRAO Socorro, NM (11/19), University of Florida (10/18), Harvard (5/17), West Virginia University (4/16), University of Virginia (4/15), NRAO Charlottesville, VA (4/15)

Real-Time Cosmology (3/18) Talk, Science with Precision Astrometry, Space Telescope Science Institute, Baltimore, MD

Midscale Summary (8/16) Invited talk, Kavli RMS Futures II, Baltimore, MD

Physics and Cosmology with the NGVLA (8/16) Invited talk, Kavli RMS Futures II, Baltimore, MD

Extragalactic Astrometry: Real-Time Cosmology with the Next Generation VLA (1/15) Invited talk, Next Generation Very Large Array Workshop, Seattle, WA

Measurement (4/14) Cognitive Astrophysics Workshop, Carnegie Observatories, Pasadena, CA

Real-Time Cosmology (12/13) Colloquium, Carnegie Observatories, Pasadena, CA

Precision Astrophysics (4/13) Colloquium, Princeton University, Princeton, NJ

Masers in Starburst Galaxies (02/12) *Invited talk* for IAU Symposium 287 “Cosmic Masers — from OH to H_o”, Stellenbosch, South Africa

Mining the Sky with WISE: Extreme Starbursts Spoofing HI and Other Oddities (10/11) Contributed talk for “Through the Infrared Looking Glass: A Dusty View of Galaxy and AGN Evolution” meeting, Pasadena, CA

The Proper Motion of the Andromeda Galaxy: The Keystone of Local Group Dynamics (3/11) “Building on New Worlds, New Horizons: New Science from Sub-millimeter to Meter Wavelengths” meeting, Santa Fe, NM

Lessons from Low-Frequency Spectral Line Observations (10/10) Contributed talk for “Robotic Science From the Moon” conference, Boulder, CO

Physical Molecular Probes of Star-Forming Galaxies (07/10) Contributed talk for “Molecules in Galaxies” conference, Oxford, UK

Lessons About Star Formation and Merging from Molecules and Dust (02/10) Contributed talk for “Infrared Emission, ISM, and Star Formation” conference, Heidelberg, Germany

Lessons About Star Formation and Merging from Molecules and Dust (09/09) Contributed talk

- for “Assembly, Gas Content and Star Formation History of Galaxies”, The Fourth North American ALMA Science Center Conference, Charlottesville, VA
- Redshifted OH Lines with SKAMP: Detection and Science** (09/09) *Invited talk* for Science with SKAMP: Widefield Spectroscopy of the Southern Radio Sky, Molonglo Observatory, Australia.
- Hydrogen 21 cm Absorption Line Searches and Studies with SKAMP** (09/09) *Invited talk* for Science with SKAMP: Widefield Spectroscopy of the Southern Radio Sky, Molonglo Observatory, Australia.
- Cosmic Evolution of Physical Constants: Precision Astronomical Measurements and the Search for High Redshift Molecules** (04/09) Colloquium, University of Kentucky (Physics)
- Molecular Pathologies: Probes of Galaxy and Black Hole Evolution, Cosmology, and Fundamental Physics** Colloquium, UC Santa Cruz (5/10), British Columbia (10/09), Ohio State (5/09), University of Kentucky (4/09), Cornell (10/06), U Wyoming (10/06)
- A Formaldehyde Deep Field with the EVLA: a Powerful New Probe of Galaxy Evolution and Cosmology** (12/08) *Invited talk* for “The EVLA Vision: Galaxies Through Cosmic Time” NRAO, Socorro, NM
- Extragalactic Molecular Spectroscopy** (05/08) *Invited talk* for “Spectroscopy with CCAT: Science and Instrumentation Opportunities” U Colorado at Boulder
- Redshifted Extragalactic Molecular Lines** (09/07) *Invited talk* for “Frontiers of Astronomy with the World’s Largest Radio Telescope” Washington, D. C.
- Masers in Starburst Galaxies** (03/07) *Invited review* for IAU Symposium 242 “Astrophysical Masers and Their Environments” Alice Springs, Australia
- Pathologies as Probes: Tunneling, Masing, and Dasing Insights into Galaxy and Black Hole Evolution, Cosmology, and Fundamental Physics** Colloquium, U Colorado Boulder (2/06)
- Are Constants Constant? A New Approach to Precision Measurement of the fine Structure Constant** JILA Astrophysics Lunch Seminar, U Colorado Boulder (9/05)
- The OH Molecule as a Probe of Galaxy Evolution and Cosmology** Colloquium, U Washington (2/04), U Colorado Boulder (3/04), UC Berkeley (3/04), Lawrence Livermore National Laboratory (3/04), NRAO Socorro (10/04), Spitzer Science Center (10/04), UC Santa Barbara (11/04), New Mexico State University (3/05)
- Cosmic Evolution of the Fine Structure Constant: Microwave Measurement Techniques, New Results, and Future Prospects** (2/04) Physics Seminar, U Washington
- OH Megamasers** (11/03) *Invited talk* for “40 Years of Scientific Discovery at Arecibo,” Arecibo
- OH Megamasers** (07/03) *Invited review* for IAU JD 21, “Astrochemistry of External Galaxies,” Sydney
- OH Megamasers: Discoveries, Insights, and Future Directions** (06/03) *Invited review* for “Future Directions in High Resolution Astronomy: The 10th Anniversary of the VLBA,” Socorro
- OH Megamasers: Luminous Tracers of Merging Galaxies, Extreme Starbursts, and Massive Black Holes** (03/02) *Invited talk* for the NAIC Visiting Committee, Arecibo Observatory.
- The Arecibo OH Megamaser Survey** (11/01) Colloquium, National Radio Astronomy Observatory, Charlottesville.
- Observing OH Megamasers with the Upgraded Arecibo Telescope** (6/01) *Invited talk*, Special Session 89: Observing with the Upgraded Arecibo Telescope: Methods and Recent Results, AAS Meeting 198, #89.03
- The Arecibo OH Megamaser Survey: Detecting Radio Beacons of Merging Galaxies.** (7/00) Colloquium, NRAO Green Bank.
- OH Megamasers at High Redshift and the Galaxy Merger Rate.** (2/00) Contributed talk, Science with the Square Kilometer Array, NAIC.

Sleepless on the Altiplano: An Astronomical Site Survey. (4/99) Andes Seminar, Department of Earth and Atmospheric Sciences, Cornell.

EXTERNAL SERVICE, COMMITTEES, & PROFESSIONAL SOCIETIES

American Astronomical Society (AAS) Code of Ethics Committee. Appointed by the AAS President to promote a high level of ethical conduct by astronomers. (2022–)

AAS Meetings Task Force. A committee to review and revise AAS meetings. (2023–)

Deep Synoptic Array-2000 Science Advisory Committee. (2022–)

Astronomy and Astrophysics 2020 Decadal Survey Reviewer. Reviewed the full National Academies survey report and the “Panel on Radio, Millimeter and Submillimeter Observations from the Ground” report. (2021)

Intelligence Science and Technology Experts Group. A new National Academies vehicle to support the Office of the Director of National Intelligence (ODNI; 2015–).

NASA Laser Interferometer Space Antenna (LISA) Study Team. Assist the U.S. community in preparing for the 2020 astrophysics Decadal Survey and provide input to the Study Office and NASA on the LISA mission. (2019–)

Committee on Astronomy and Astrophysics. A joint standing committee of the National Academies’ Space Studies Board and the Board on Physics and Astronomy. (2012–2018)

NSF Mid-Scale Research Infrastructure Reviewer. (2023)

NSF Major Facility Support Reviewer. (2020)

NRAO Visiting Committee. An AUI management advisory committee. (2023–)

NSF Program Review Panel. (2020, 2021)

NASA Astrophysics Data Analysis Program Panel. (2021)

UCSD Astrophysics PhD Program Proposal Reviewer. (2021)

Next Generation Very Large Array Science Working Group. Time Domain, Fundamental Physics, and Cosmology (2014–)

ALMA Review Panel for Studies of Proposed Development Upgrades. (2016)

NRAO Time Allocation Committee. (2014–2016). Chair 2016.

NRAO Extragalactic Spectral Line Science Review Panel. (Chair, 2014–2016)

NSF Mid-Scale Research Infrastructure Reviewer. (2019)

NSF Large Facility Management Competition Reviewer. (2015)

NRAO Users Committee. An NRAO advisory committee (2004–2007; 2012–2013). Vice-Chair 2006–2007.

NRAO Student Observing Support Committee. (2008–2012)

NRAO Jansky Fellowship Committee. (2007–2010)

NAIC Users Scientific Advisory Committee. A National Astronomy and Ionosphere Center (Arecibo) advisory committee (2008–2010). Chair 2009–2010.

Arecibo Annual Program Plan Review Panel. An NSF advisory committee (2007, 2013 [chair])

Scientific Organizing Committees. “Boulder Extragalactic Astrophysics Retreat” (Chair, 2011, 2012, 2015); “Chicago-3 Community Workshop: Implementation of the SKA Program for the US Community” (2007)

Observatory Referee. Refereed proposals for VLA, VLBA, ALMA, GMRT, and HST.

AAS Referee. Referee for the AAS Chambliss Astronomy Achievement Student Awards (2010–2013)

Square Kilometer Array Science Working Group. Contributing author to two chapters of the book “Science with the Square Kilometer Array,” eds. C. Carilli & S. Rawlings, 2004, New Astronomy Reviews (Elsevier; Amsterdam).

Journal Referee. Refereed submissions for Nature, Phys. Rev. Lett., ApJ, AJ, MNRAS, PASP, Phys. Rev. D, A&A, and JCAP.

Book Proposal Referee. Refereed submission for CRC press (2023).

Grant Referee. Refereed grant proposals for the U.S. Civilian Research and Development Foundation, for the Netherlands Organisation for Scientific Research (NWO), and for the Basic Research Department of the Ministry of Science and Environmental Protection, Republic of Serbia. Refereed NASA Post-doctoral Program (NPP) applications and major NSF observing facility operations grant proposals. “Red team” reader for Canadian observing facility construction and operations proposal.

Book Reviews. Review, feedback, and blurbs for Cambridge University Press.

American Astronomical Society. (1998–)

American Physical Society. (2020–)

Sigma Xi. The Scientific Research Society (1995–2015)

UNIVERSITY SERVICE

CASA Director. (2021–)

Astrophysical Research Consortium Board of Governors. (2014–2017, 2019–)

Astrophysical Research Consortium Director Search Committee. (2016)

Sloan V Survey Advisory Council. (2019–)

Sloan IV Survey Advisory Council. (2014–2017, 2019–2021)

Sloan IV Survey Collaboration Council Representative. (2013–2016)

University of Colorado Leadership Institute. Class of 2016–2017

Natural Sciences Divisional Council Representative. College of Arts and Sciences (Jan–Aug 2022).

Appeals Committee on Academic Rules and Policies. College of Arts and Sciences (2014–2015)

Astrophysical and Planetary Sciences (APS) Executive Committee. (2010–2012, 2014–2015, 2016–2018)

APS Graduate Exams Committee. (Chair 2019–)

APS Hiring Proposal Committee. (2023; Chair)

APS Hiring Plan Committee. (2013; Chair 2020–2022)

APS Graduate Admissions Setup Committee. (2019)

APS Faculty Cluster Hire Setup Committee. (2018; Chair)

APS Time-Domain Faculty Search Committee. (2017–2018)

APS Primary Unit Evaluation Committee. Z. Berta-Thompson tenure (2023); M. Kazachenko reappointment (2022); B. Brown tenure (2020); J. Comerford tenure (2018); B. Brown reappointment (2018); J. Comerford reappointment (2016); C. Danforth reappointment (Chair 2015)

APS Climate Committee. (2015–2017; Chair 2016)

APS Awards Committee. (Chair 2015–2016)

APS Program Fees Committee. (2014–2017)

APS Department Associate Chair. (7/2014–6/2015)

APS Graduate Admissions Committee. (2008–2013)

APS Colloquium Committee. Chair (2007–2009)

APS Diversity and Graduate Student Concerns Committee. (2007–2008)
Apache Point Observatory Referee. (2006–2011; Chair 2009–2011)
Cosmos Computing Lab Upgrade Committee. Chair (2007)
APS Observatories Committee. (2006–2007)
CASA Associate Director. (7/2016–2018)
CASA Executive Committee. (2008–2010, 2016–2018, 2019–2020)
CASA Salary Review Committee. (2007, 2016, 2019; Chair 2017 & 2018)
CASA CCAT/LMT Advisory Committee. (2015–2019)

PUBLIC OUTREACH

Science on a Sphere. Proper motion data visualization for worldwide distribution (2018–)
Colorado Springs Astronomical Society. Public talk “The Universe” (May 2021)
Scientific Sense Podcast Interview (December 2020)
Northern Colorado Astronomical Society. Public talk “The Universe” (November 2020)
Chautauqua Space Series. Public talk on “A Tour of the History of the Universe” (October 2015)
TEDx Boulder. Public talk on “Water in the Universe” (August 2010)
Public Education. Public sessions at Sommers Bausch Observatory (2006–). Class visits and special events work at public schools (Longfellow Elementary, Pasadena High). “Ask a Scientist” article for Ithaca Journal.
Caltech SURF Day. Session chair for student presentations (2002, 2003).

PRESS

Putting the Theory of Special Relativity into Practice, by Counting Galaxies. Colorado Arts and Sciences Magazine, various outlets, May 2022
Researchers Discover Megamaser Five Billion Light Years from Earth. CU Boulder Today, various outlets, April 2022
Astrophysicist Probes Cosmic “Dark Matter Detector.” CU Boulder Today, Medium, various outlets, September 2020
Astronomers Find Wandering Black Holes in Dwarf Galaxies. NRAO press release, Forbes, various outlets, January 2020
ALMA Dives into Black Hole’s “Sphere of Influence.” Multiple outlets, #2 ALMA science discovery of 2019, August 2019
Close Galactic Encounter Leaves “Nearly Naked” Supermassive Black Hole. NSF Science 360 News top story, multiple outlets, November 2016
ALMA Measures Mass of Supermassive Black Hole. Multiple outlets, May 2016
New Measurements Confirm That the Universe Is Boring. Multiple outlets, June 2014
Galactic Collision Gave Andromeda its Arms. Nature News, June 2014
Cooking Up High-Mass Stars. Sky and Telescope, June 2014
Universe Expanding Symmetrically, Real-Time Analysis Shows. Multiple outlets, April 2014
Hunt is on for “Rogue” Black Holes. Multiple outlets, March 2014
ALMA Probes Mysteries of Jets from Giant Black Holes. Multiple outlets, October, 2013
Andromeda on Collision Course with the Milky Way. R. Cowen, *Nature News*, May 31, 2012

BBC Television, The Wonders of Life. Phone interview on water in the Universe, March 28, 2012

Hit or Miss: Will the Andromeda Galaxy Collide with the Milky Way? *J. Darling.* 2011, NRAO eNews, Volume 4, Issue 10

SA Has the Whole World Starry-Eyed. R. Philp. 2010, South African Times, Oct 17

Starbursts Near and Far. Y. Gao. 2008, *Nature News and Views*, 452, 417

Water, Water Everywhere? *J. Darling.* 2008, NRAO eNews, Volume 1, Issue 4

Magnetic Fields in Other Galaxies. UC Berkeley, *Astronomy*, January 16, 2007

Popular Citation of Research. Popular article in *Astronomy Now* (UK), August, 2002