

# Jeremiah K. Darling

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## EDUCATION

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**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

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**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)

## GRANTS

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**National Science Foundation (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 07-07713)

**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)

## ACADEMIC EMPLOYMENT & RESEARCH

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**Associate Professor** (5/13–present) University of Colorado. Real-time cosmology. Astrometry, proper motion, and precision spectroscopy. Physical probes of galactic and extragalactic star formation. Massive black holes. Physical constants and the neutron lifetime.

**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 $\alpha$  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 $\alpha$  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 $\alpha$  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.

- 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)
- ALMA Observations of Circumnuclear Disks in Early-type Galaxies: <sup>12</sup>CO(2-1) and Continuum Properties.** B. D. Boizelle, A. J. Barth, J. Darling, A. J. Baker, D. A. Buote, L. C. Ho, & J. L. Walsh. 2017, ApJ, 845, 170 (20pp)
- Sloan Digital Sky Survey IV: Mapping the Milky Way, Nearby Galaxies, and the Distant Universe.** M. R. Blanton, M. A. Bershady, B. Abolfathi, et al. (363 coauthors). 2017, AJ, 154, 28 (35pp)
- The Invisible AGN Catalogue: A Mid-Infrared-Radio Selection Method for Optically Faint Active Galactic Nuclei.** A. E. Truebenbach & J. Darling. 2017, MNRAS, 468, 196 (10pp)
- Thermal Feedback in the High-mass Star- and Cluster-forming Region W51.** A. Ginsburg, C. Goddi, J. M. D. Kruijssen, J. Bally, R. Smith, R. Galván-Madrid, E. A. C. Mills, K. Wang, J. E. Dale, J. Darling, E. Rosolowsky, R. Loughnane, L. Testi, & N. Bastian. 2017, ApJ, 842, 92 (34pp)
- How to Detect Inclined Water Maser Disks (and Possibly Measure Black Hole Masses).** J. Darling. 2017, ApJ, 837, 100 (15pp)

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

- A Nearly Naked Supermassive Black Hole.** J. J. Condon, *J. Darling*, Y. Y. Kovalev, & L. Petrov. 2017, *ApJ*, 834, 184 (8pp)
- Toward gas exhaustion in the W51 high-mass protoclusters.** *A. Ginsburg*, W. M. Goss, C. Goddi, R. Galván-Madrid, J. E. Dale, J. Bally, *C. D. Battersby*, *A. Youngblood*, R. Sankrit, R. Smith, *J. Darling*, J. M. D. Kruijssen, & H. B. Liu. 2016, *A&A*, 595, A27 (27pp)
- Water Masers in the Andromeda Galaxy. II. Where Do Masers Arise?** *N. Amiri* & *J. Darling*. 2016, *ApJ*, 826, 136 (14pp)
- Water Masers in the Andromeda Galaxy. I. A Survey for Water Masers, Ammonia, and Hydrogen Recombination Lines.** *J. Darling*, *B. Gerard*, *N. Amiri*, & *K. Lawrence*. 2016, *ApJ*, 826, 24 (11pp)
- Identifying OH Imposters in the ALFALFA Neutral Hydrogen Survey.** *K. A. Suess*, *J. Darling*, M. P. Haynes, & R. Giovanelli. 2016, *MNRAS*, 459, 220 (12pp)
- Measurement of the Black Hole Mass in NGC 1332 from ALMA Observations at 0.044 arcsecond Resolution.** A. J. Barth, B. D. Boizelle, *J. Darling*, A. J. Baker, D. A. Buote, L. C. Ho, & J. L. Walsh. 2016, *ApJ*, 822, L28 (5pp)
- Toward Precision Black Hole Masses with ALMA: NGC 1332 as a Case Study in Molecular Disk Dynamics.** A. J. Barth, *J. Darling*, A. J. Baker, B. D. Boizelle, D. A. Buote, L. C. Ho, & J. L. Walsh. 2016, *ApJ*, 823, 51 (22pp)
- Invisible Active Galactic Nuclei II: Radio Morphologies and Five New HI 21 cm Absorption Line Detections.** *T. Yan*, J. T. Stocke, *J. Darling*, E. Momjian, S. Sharma, & N. Kanekar. 2016, *AJ*, 151, 74 (43pp)
- Dense Gas in the Galactic Central Molecular Zone is Warm and Heated by Turbulence.** *A. Ginsburg*, C. Henkel, Y. Ao, D. Riquelme, J. Kauffmann, T. Pillai, E. A. C. Mills, M. A. Requena-Torres, K. Immer, L. Testi, J. Ott, J. Bally, *C. Battersby*, *J. Darling*, S. Aalto, T. Stanke, S. Kendrew, J. M. D. Kruijssen, S. Longmore, J. Dale, R. Guesten, & K. M. Menten. 2016, *A&A*, 586, A50 (31pp)
- The SDSS-IV extended Baryon Oscillation Spectroscopic Survey: Overview and Early Data.** K. S. Dawson, J.-P. Kneib, W. J. Percival, S. Alam, F. D. Albareti, (+141 alphabetical coauthors). 2016, *AJ*, 151, 44 (34pp)
- The Dense Gas Mass Fraction in the W51 Cloud and its Protoclusters.** *A. Ginsburg*, J. Bally, *C. Battersby*, *A. Youngblood*, *J. Darling*, E. Rosolowsky, H. Arce, & M. E. Lebrón Santos. 2015, *A&A*, 573, A106 (27pp)
- The Hubble Expansion is Isotropic in the Epoch of Dark Energy.** *J. Darling*. 2014, *MNRAS*, 442, L66 (5pp)
- The Onset of Massive Star Formation: The Evolution of Temperature and Density Structure in an Infrared Dark Cloud.** *C. Battersby*, *A. Ginsburg*, J. Bally, S. Longmore, M. Dunham, & *J. Darling*. 2014, *ApJ*, 787, 113 (21pp)
- Detection of Chloronium and Measurement of the  $^{35}\text{Cl}/^{37}\text{Cl}$  Isotopic Ratio at  $z = 0.89$  toward PKS 1830–211.** S. Muller, J. H. Black, M. Guélin, C. Henkel, F. Combes, M. Gérin, S. Aalto, A. Beelen, *J. Darling*, C. Horellou, S. Martín, K. M. Menten, Dinh V-Trung, & M. A. Zwaan. 2014, *A&A*, 566, L6 (4pp)
- An ALMA Early Science Survey of Molecular Absorption Lines toward PKS 1830–211. Analysis of the Absorption Profiles.** S. Muller, F. Combes, M. Guélin, M. Gérin, S. Aalto, A. Beelen, J. H. Black, S. J. Curran, *J. Darling*, Dinh V-Trung, S. García-Burillo, C. Henkel, C. Horellou, S. Martín, I. Martí-Vidal, K. M. Menten, M. T. Murphy, J. Ott, T. Wiklind, & M. A. Zwaan. 2014, *A&A*, 566, A112 (21pp)
- The Comparison of Physical Properties Derived from Gas and Dust in a Massive Star-forming Region.** *C. Battersby*, J. Bally, M. Dunham, *A. Ginsburg*, S. Longmore, & *J. Darling*. 2014, *ApJ*,

**Objects Appear Smaller as they Recede: How Proper Motions can Directly Reveal the Cosmic Expansion, Provide Geometric Distances, and Measure the Hubble Constant.**

*J. Darling*. 2013, *ApJ*, 777, L21 (5pp)

**Ammonia Thermometry of Star Forming Galaxies.** J. G. Mangum, *J. Darling*, C. Henkel, K. M. Menten, M. MacGregor, B. E. Svoboda, & E. Schinnerer. 2013, *ApJ*, 779, 33 (27pp)

**A Measurement of the Turbulence-Driven Density Distribution in a Non-Star-Forming Molecular Cloud.** A. Ginsburg, C. Federrath, & *J. Darling*. 2013, *ApJ*, 779, 50 (9pp)

**Probing the Jet Base of the Blazar PKS 1830-211 from the Chromatic Variability of its Lensed Images. Serendipitous ALMA Observations of a Strong Gamma-Ray Flare.**

I. Martí-Vidal, S. Müller, F. Combes, S. Aalto, A. Beelen, *J. Darling*, M. Guélin, C. Henkel, C. Horellou, J. M. Marcaide, S. Martín, K. M. Menten, D. V-Trung, M. Zwaan. 2013, *A&A*, 558, A123 (12pp)

**Formaldehyde Densitometry of Starburst Galaxies: Density-Independent Global Star Formation.**

J. G. Mangum, *J. Darling*, C. Henkel, & K. M. Menten. 2013, *ApJ*, 766, 108 (26pp)

**Toward a Direct Measurement of the Cosmic Acceleration.** *J. Darling*. 2012, *ApJ*, 761, L26 (5pp)

**Invisible AGN I: Sample Selection and Optical/Near-IR Spectral Energy Distributions.**

T. Yan, J. T. Stocke, *J. Darling*, & F. Hearty. 2012, *AJ*, 144, 124 (13pp)

**Formaldehyde Silhouettes Against the Cosmic Microwave Background: A Mass-Limited, Distance-Independent, Extinction-Free Tracer of Star Formation Across the Epoch of Galaxy Evolution.** *J. Darling* & B. Zeiger. 2012, *ApJ*, 749, L33 (6pp)

**The ALFALFA HI Absorption Pilot Survey: A Wide-Area Blind Damped Lyman Alpha System Survey of the Local Universe.** *J. Darling*, E. P. Macdonald, M. P. Haynes, R. Giovanelli. 2011, *ApJ*, 742, 60 (7pp)

**Galactic H<sub>2</sub>CO Densitometry I: Pilot Survey of Ultracompact HII Regions and Methodology.**

A. Ginsburg, *J. Darling*, C. Battersby, B. Zeiger, & J. Bally. 2011, *ApJ*, 736, 149 (24pp)

**Water Masers in the Andromeda Galaxy: The First Step Toward Proper Motion.** *J. Darling*.

2011, *ApJ*, 732, L2 (6pp)

**Mid-Infrared Properties of OH Megamaser Host Galaxies: I. Spitzer IRS Low- and High-Resolution Spectroscopy.** K. Willett, *J. Darling*, L. Armus, H. Spoon, & V. Charmandaris. 2011,

*ApJS*, 193, 18 (23pp)

**Mid-Infrared Properties of OH Megamaser Host Galaxies: II. Analysis and Modeling of the Maser Environment.** K. Willett, *J. Darling*, H. Spoon, V. Charmandaris, & L. Armus, 2011, *ApJ*,

730, 56 (14pp)

**Water Masers Associated with Star Formation in the Antennae Galaxies.** C. Brogan, K. Johnson, & *J. Darling*. 2010, *ApJ*, 716, L51 (6pp)

**Spitzer Mid-IR Spectroscopy of Compact Symmetric Objects: What Powers Radio-Loud Active Galactic Nuclei?** K. W. Willett, J. T. Stocke, *J. Darling*, & E. S. Perlman. 2010, *ApJ*, 713,

1393 (20pp)

**Formaldehyde Anti-Inversion at  $z = 0.68$  in the Gravitational Lens B0218+357.** B. Zeiger & *J.*

*Darling*. 2010, *ApJ*, 709, 386 (10pp)

**New Searches for HI 21 cm in Damped Lyman  $\alpha$  Absorption Systems.** S. J. Curran, P. Tzanavaris,

*J. Darling*, M. T. Whiting, J. K. Webb, C. Bignell, R. Athreya, & M. T. Murphy. 2010, *MNRAS*, 402, 35 (11pp)

**Science with ASKAP, The Australian Square-Kilometre-Array Pathfinder.** S. Johnston, R. Taylor, M. Bailes, N. Bartel, C. Baugh, M. Bietenholz, C. Blake, R. Braun, J. Brown, S. Chatterjee, *J.*

- Darling*, (+39 coauthors). 2008, *Experimental Astronomy*, 22, 151 (123pp)
- Ubiquitous Water Masers in Nearby Star-Forming Galaxies.** *J. Darling*, C. Brogan, & K. Johnson. 2008, *ApJ*, 685, L39 (4pp)
- Properties of Active Galaxies Deduced from HI Observations.** L. C. Ho, *J. Darling*, & J. E. Greene. 2008, *ApJ*, 681, 128 (13pp)
- A New HI Survey of Active Galaxies.** L. C. Ho, *J. Darling*, & J. E. Greene. 2008, *ApJS*, 177, 103 (28pp)
- Formaldehyde Densitometry of Starburst Galaxies.** J. G. Mangum, *J. Darling*, K. M. Menten, & C. Henkel. 2008, *ApJ*, 673, 832 (15pp)
- Science with the Australian Square Kilometre Array Pathfinder.** S. Johnston, M. Bailes, N. Bartel, C. Baugh, M. Bietenholz, C. Blake, R. Braun, J. Brown, S. Chatterjee, *J. Darling*, (+40 coauthors). 2007, *PASA*, 24, 174 (15pp)
- HI and OH Absorption in the Lensing Galaxy of MG J0414+0534.** S. J. Curran, *J. Darling*, A. D. Bolatto, M. T. Whiting, C. Bignell, & J. K. Webb. 2007, *MNRAS*, 382, L11 (5pp)
- A Dense Gas Trigger for OH Megamasers.** *J. Darling*. 2007, *ApJ*, 669, L9 (4pp)
- Optical Spectral Classification of Major Mergers: OH Megamaser Hosts Versus Non-Masing (Ultra)Luminous Infrared Galaxies.** *J. Darling* & R. Giovanelli. 2006, *AJ*, 132, 2596 (22pp)
- The Arecibo Legacy Fast ALFA Survey. I. Science Goals, Survey Design, and Strategy.** R. Giovanelli, et al. 2005, *AJ*, 130, 2598 (15pp)
- On the X-Ray Properties of OH Megamaser Sources: Chandra Snapshot Observations.** C. Vignali, W. N. Brandt, A. Comastri, & *J. Darling*. 2005, *MNRAS*, 364, 99 (8pp)
- High Resolution Imaging of the OH Megamaser Emission in IRAS 12032+1707 and IRAS 14070+0525.** Y. M. Pihlström, W. A. Baan, *J. Darling*, & H.-R. Klöckner. 2005, *ApJ*, 618, 705 (7pp)
- Detection of 21 cm HI Absorption at  $z = 0.78$  in a Survey of Radio Continuum Sources.** *J. Darling*, R. Giovanelli, M. P. Haynes, A. D. Bolatto, & G. C. Bower. 2004, *ApJ*, 613, L101 (4pp)
- A Laboratory for Constraining Cosmic Evolution of the Fine Structure Constant: Conjugate 18 cm OH Lines Toward PKS 1413+135 at  $z = 0.2467$ .** *J. Darling*. 2004, *ApJ*, 612, 58 (6pp)
- Methods for Constraining Fine Structure Constant Evolution with OH Microwave Transitions.** *J. Darling*. 2003, *Phys. Rev. Lett.*, 91, 011301 (4pp)
- Peculiar Broad Absorption Line Quasars Found in The Digitized Palomar Observatory Sky Survey.** R. J. Brunner, P. B. Hall, S. G. Djorgovski, R. R. Gal, A. A. Mahabal, P. A. A. Lopes, R. R. De Carvalho, S. C. Odewahn, S. Castro, D. Thompson, F. Chaffee, *J. Darling*, & V. Desai. 2003, *AJ*, 126, 53 (10pp)
- A Search for 6.7 GHz Methanol Masers in OH Megamaser Galaxies at  $0.11 < z < 0.27$ .** *J. Darling*, P. Goldsmith, D. Li, & R. Giovanelli. 2003, *AJ*, 125, 1177 (5pp)
- The OH Megamaser Luminosity Function.** *J. Darling* & R. Giovanelli. 2002, *ApJ*, 572, 810 (13pp)
- The Discovery of Time Variability in OH Megamasers.** *J. Darling* & R. Giovanelli. 2002, *ApJ*, 569, L87 (4pp)
- A Search for OH Megamasers at  $z > 0.1$ . III. The Complete Survey.** *J. Darling* & R. Giovanelli. 2002, *AJ*, 124, 100 (27pp)
- A Search for OH Megamasers at  $z > 0.1$ . II. Further Results.** *J. Darling* & R. Giovanelli. 2001, *AJ*, 121, 1278 (16pp)
- A Search for OH Megamasers at  $z > 0.1$ . I. Preliminary Results.** *J. Darling* & R. Giovanelli. 2000, *AJ*, 119, 3003 (12pp)

**The Optical/Infrared Astronomical Quality of High Atacama Sites. I. Optical Seeing** R. Giovanelli, *J. Darling*, M. Sarazin, J. Yu, P. Harvey, C. Henderson, W. Hoffman, L. Keller, D. Barry, J. Cordes, S. Eikenberry, G. Gull, J. Harrington, J. D. Smith, G. Stacey, & M. Swain. 2001, *PASP*, 113, 789 (14pp)

**The Optical/Infrared Astronomical Quality of High Atacama Sites. II. Infrared Characteristics** R. Giovanelli, *J. Darling*, C. Henderson, W. Hoffman, D. Barry, J. Cordes, S. Eikenberry, G. Gull, L. Keller, J. D. Smith, & G. Stacey. 2001, *PASP*, 113, 803 (11pp)

**The Nonvariability of the Progenitor of Supernova 1993J in M81.** J. G. Cohen, *J. Darling*, & A. Porter. 1995, *AJ*, 110, 308 (4pp)

## REFEREED REPORTS

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**Report Series: Committee on Astronomy and Astrophysics: Mission Concept Studies.**

Committee on Astronomy and Astrophysics, National Academies of Sciences, Engineering, and Medicine. 2018. Washington, DC: The National Academies Press, <https://doi.org/10.17226/25212>.

**Report Series: Committee on Astronomy and Astrophysics: Small Explorer Missions.**

Committee on Astronomy and Astrophysics, National Academies of Sciences, Engineering, and Medicine. 2017. Washington, DC: The National Academies Press, <https://doi.org/10.17226/24808>.

## NON-REFEREED JOURNAL PUBLICATIONS

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**The  $^{87}\text{Rb}$  Atomic Clock Maser in Giant Stars.** *J. Darling*. 2018, *RNASS*, 2, 15 (2pp)

## REFEREED BOOK CHAPTERS

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**A Formaldehyde Deep Field.** *J. Darling*. 2018, Astronomical Society of the Pacific, “Science with a Next-Generation Very Large Array,” ed. E. Murhpy

**Extragalactic Proper Motions: Gravitational Waves and Cosmology.** *J. Darling*, *A. Truebenbach*, & *J. Paine*. 2018, Astronomical Society of the Pacific, “Science with a Next-Generation Very Large Array,” ed. E. Murhpy

**Offset Active Galactic Nuclei.** L. Blecha, W. Brisken, S. Burke-Spolaor, F. Civano, J. Comerford, *J. Darling*, J. Lazio, & T. Macarrone. 2018, Astronomical Society of the Pacific, “Science with a Next-Generation Very Large Array,” ed. E. Murhpy

## CONFERENCE PROCEEDINGS, BOOK CHAPTERS, & WHITE PAPERS

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**The Galaxy Evolution Probe: A concept for a mid and far-infrared space observatory.** J. Glenn, C. M. Bradford, R. Amini, B. Moore, A. Benson, L. Armus, K. Alatalo, *J. Darling*, P. Day, J. Domber, et. al. 2018, SPIE, Space Telescopes and Instrumentation 2018: Optical, Infrared, and Millimeter Wave, eds. M. Lystrup, H. A. MacEwen, G. G. Fazio, 10698 (16pp)

**Sardinia Radio Telescope (SRT) observations of Local Group dwarf galaxies.** A. Tarchi, P. Castangia, G. Surcis, A. Brunthaler, K. M. Menten, M. S. Pawlowski, A. Melis, S. Casu, M. Murgia, A. Trois, R. Concu, C. Henkel, & *J. Darling*. 2018, Proceedings of the International Astronomical Union, “Astrophysical Masers: Unlocking the Mysteries of the Universe,” 13, S336, 109 (4pp)

**Densitometry and Thermometry of Starburst Galaxies.** J. G. Mangum, *J. Darling*, K. M. Menten, C. Henkel, S. Aalto, M. Spaans, P. van der Werf, *A. Ginsburg*, E. Fomalont, B. Cotton. 2016, 6th Zermatt ISM Symposium on Conditions and Impact of Star Formation: From Lab to Space, eds. R. Simon, R. Schaaf, J. Stutzki J, EDP Sciences, 61 (5pp)

**Time Domain, Fundamental Physics, and Cosmology.** G. C. Bower, P. Demorest, J. Braatz, A. Broderick, S. Burke-Spolaor, B. Butler, T.-C. Chang, L. Chomiuk, J. Cordes, *J. Darling*, J. Eilek, G. Hallinan, N. Kanekar, M. Kramer, D. Marrone, W. Max-Moerbeck, B. Metzger, M. Morales, S.



- Myers, R. Osten, F. Owen, M. Rupen, & A. Siemion. 2015, Next Generation Very Large Array Memo No. 9, Science Working Group 4, astro-ph/1510.06432 (42pp)
- Densitometry of Active Star Forming Galaxies.** C. Henkel, J. G. Mangum, *J. Darling*, & K. M. Menten. 2013, Molecular Gas, Dust, and Star Formation in Galaxies, Proceedings of the IAU Symp. 292, eds. J. Ott & T. Wong, 239 (4pp)
- Masers in Starburst Galaxies.** *J. Darling*. 2012, Cosmic Masers — from OH to H<sub>o</sub>, Proceedings IAU Symp. 287, eds. R. Booth, E. Humphries, & W. Vlemmings, 333 (7pp)
- VLBA Observations of a Complete Sample of 2MASS Galaxies.** J. Condon, *J. Darling*, Y. Y. Kovalev, & L. Petrov. 2011, 11th Asian-Pacific Regional IAU Meeting, NARIT Conference Series, arXiv:1110.6252 (2pp)
- Densitometry and Thermometry of Starburst Galaxies.** J. G. Mangum, *J. Darling*, K. M. Menten, C. Henkel, & M. MacGregor. 2011, 5th Zermatt ISM Symposium, EDP Sciences, 52, 71 (4pp)
- How Do Galaxies Accrete Gas and Form Stars?** M. E. Putman et al. (46 authors). 2009, Astronomy and Astrophysics Decadal Survey white paper (8pp)
- A Radio Sky Surveys Project with the Allen Telescope Array** G. Bower et al. (52 authors). 2009, Astronomy and Astrophysics Decadal Survey white paper (20pp)
- Masers in Starburst Galaxies** *J. Darling*. 2007, Proc. IAU Symp. 242, Astrophysical Masers and Their Environments, eds. J. M. Chapman & W. A. Baan, 242, 417 (10pp)
- Formaldehyde: A High Redshift Tracer of Pre-Starburst Gas?** *J. Darling*. 2006, ASP Conf. Ser., From Z-Machines to ALMA: (Sub)millimeter Spectroscopy of Galaxies, eds. A. J. Baker, J. Glenn, A. I. Harris, J. G. Mangum, & M. S. Yun., 375, 208 (7pp)
- Searching for High-Redshift Centimeter-Wave Continuum, Line, and Maser Emission Using the Square Kilometer Array.** A. W. Blain, C. Carilli, & *J. Darling*. 2004, Science with the Square Kilometer Array, eds. C. Carilli & S. Rawlings, New Astronomy Reviews, 48, 1247 (11pp)
- Measuring Changes in the Fundamental Constants with Redshifted Radio Absorption Lines.** S. J. Curran, N. Kanekar, & *J. Darling*. 2004, Science with the Square Kilometer Array, eds. C. Carilli & S. Rawlings, New Astronomy Reviews, 48, 1095 (11pp)
- OH Megamasers: Discoveries, Insights, and Future Directions.** *J. Darling*. 2005, ASP Conf. Ser., Future Directions in High Resolution Astronomy: The 10th Anniversary of the VLBA, ed. J. D. Romney & M. J. Reid, 340, 216 (8pp)
- The Arecibo OH Megamaser Survey and the Galaxy Merger Rate.** *J. Darling*, and R. Giovanelli. 2000, ASP Conf. Ser., Gas and Galaxy Evolution, ed. J. Hibbard, M. Rupen, & J. van Gorkom, 240, 200 (2pp)
- A Search for OH Megamasers at  $z > 0.1$ : Preliminary Results.** *J. Darling*, and R. Giovanelli. 2001, ASP Conf. Ser., Science with the Atacama Large Millimeter Array, ed. A. Wootten, 235, 309 (4pp)
- Luminosity Function of  $z > 4$  Quasars from the Second Palomar Sky Survey.** J. D. Kennefick, *J. Darling*, S. G. Djorgovski, & R. R. de Carvalho. 1997, Young Galaxies and QSO Absorption-Line Systems, ASP Conference Series, Vol. 114, ed. Sueli M. Viegas, Ruth Gruenwald, & Reinaldo R. de Carvalho, 95 (4pp)

## ABSTRACTS

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- 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, 25<sup>th</sup> 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

- 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

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**Internal Processes in Gases/Atomic and Molecular Processes.** University of Colorado, ASTR 5110, 3–4 credit hours, 8–14 students, Fall 2007, Fall 2008, Fall 2009, Fall 2012, Fall 2015, Fall 2016, Fall 2018

**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

**General Astronomy: Stars and Galaxies.** University of Colorado, ASTR 1120/1200, 3 credit hours, 100–202 students, Spring 2009, Fall 2010, Fall 2011

**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,

## MENTORING

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**Faculty Mentor.** Zachory Berta-Thompson (2016–).

**Postdoctoral Research Advisor.** Nikta Amiri (2012–2015).

**PhD Dissertation Advisor.** Kyle Willett (2006–2011; 2011 PhD). Alexandra Truebenbach (2014–2018; 2018 PhD). Jennie Paine (2018–).

**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).

**Graduate Research Mentor.** Employed graduate students Anthony Smith (Fall 2009), Amandeep Gill (Fall 2010–Spring 2011), Jen Kulow (Spring 2012–Fall 2012).

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

**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.

**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.

**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.

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

**Undergraduate Research Mentor.** Employed undergraduate students Kathryn Grasha (Summer 2009–2011; now in U Mass PhD program), Srikar Appana (Summer 2010–Fall 2010), Kelsey Lawrence (Fall 2011–Spring 2012), Kirsten Pedersen (Summer 2012), Samantha Valenteen (Spring 2016), Katherine Pellicore (Summer 2015), Megan Maguire (Summer & Fall 2016), Andréia Ribeiro De Noronha Sales (Summer 2017), Sarah Stasiowski (Summer 2017–Summer 2018), Alexander Koek (Fall 2018).

**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

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

**Real-Time Cosmology** Colloquium, University of Florida (10/18), Harvard (5/17), West Virginia Uni-

versity (4/16), University of Virginia (4/15), NRAO Charlottesville, VA (4/15)  
**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<sub>o</sub>”, 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**

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- 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).
- Intelligence Science and Technology Experts Group.** A new National Academies vehicle to support the Office of the Director of National Intelligence (ODNI; 2015–).
- 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 Large Facility Management Competition Reviewer.** (2015)
- NRAO Users Committee.** A 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 NRAO for VLA and VLBA programs (2005–2006)

**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 Phys. Rev. Lett., ApJ, AJ, MNRAS, PASP, and A&A.

**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 Postdoctoral Program (NPP) applications and two 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–)

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

## UNIVERSITY SERVICE

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**CASA Associate Director.** (7/2016–2018)

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

**CASA Salary Review Committee.** (2007, 2016; Chair 2017 & 2018)

**CASA Executive Committee.** (2008–2010, 2016–2018)

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

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

**APS Primary Unit Evaluation Committee.** J. Comerford tenure (2018); B. Brown reappointment (2018); J. Comerford reappointment (2016); C. Danforth reappointment (Chair 2015)

**University of Colorado Leadership Institute.** Class of 2016–2017

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

**Astrophysical Research Consortium Director Search Committee.** (2016)

**Sloan IV Survey Advisory Council.** (2014–2017)

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

**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)

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

**CASA CCAT Advisory Committee.** (2015–)

**APS Hiring Plan Committee.** (2013)

**APS Colloquium Committee.** Chair (2007–2009)

**APS Graduate Admissions Committee.** (2008–2013)

**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)

## **PUBLIC OUTREACH**

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**Science on a Sphere.** Proper motion data visualization for worldwide distribution (2018)

**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**

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**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