

Aren (Ari) N. Heinze

Postdoctoral Researcher
Institute for Astronomy
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Education:

Ph. D. in Astronomy, 2007, University of Arizona, Tucson
B. S. in Astronomy, 2001, California Institute of Technology, Pasadena

Research Experience:

- 2015-present: Postdoctoral Researcher, Institute for Astronomy, University of Hawaii: Assisted construction, software, and operations development of the Asteroid Terrestrial-impact Last Alert System (ATLAS). Analyzed ATLAS data to optimize asteroid detection, probe near-Earth asteroid populations, and discover/characterize 427,000 variable stars. Continued to study the population of very small main-belt asteroids using digital tracking.
- 2011-2015: Postdoctoral Researcher, Stony Brook University: Studied clouds in brown dwarf atmospheres through multi-wavelength photometric monitoring using Spitzer and ground-based telescopes, in collaboration with Stanimir Metchev and others. Began additional project on digital tracking searches for extremely faint asteroids.
- 2009-2011: Sole Proprietor, Hopewriter Publishing (see below). Despite full time employment with Hopewriter, continued work on the search for extrasolar planets using adaptive optics (AO) imaging, in collaboration with Phil Hinz and others at the University of Arizona. Experimented with digital tracking of asteroids using personal 20 inch telescope and CCD.
- 2007-2009: Visiting Professor, Swarthmore College: Continued work on AO searches for extrasolar planets. Performed precise photometric analysis of Kuiper Belt dwarf planet Makemake, leading to first determination of its rotation period. Implemented maximum entropy deconvolution for analysis of resolved AO images of the asteroid 4 Vesta, in collaboration with Faith Vilas.
- 2001-2007: Graduate Researcher, University of Arizona; Advisor: Philip M. Hinz. Performed simulations in support of AO coronagraph design. Commissioned the Clio 3-5 micron camera for the MMT AO system. Carried out spectral analysis of nearby transiting planet candidates. Carried out an AO imaging survey of 50 nearby stars for extrasolar planets using the 6.5m MMT on Mt. Hopkins.
- Summer 1999: Summer Undergraduate Research Fellow (SURF) with Bonnie J. Buratti, JPL/Caltech: Photometric observations and analysis of Pluto to search for evidence of volatile transport or atmospheric freeze-out.

Teaching Experience:

- 2007-2009: Visiting Professor, Swarthmore College: Organized and taught the very popular course Astro 1: Introductory Astronomy for non-majors. Organized and taught Astro 16: Modern Astrophysics for majors. Oversaw and graded a variety of astronomy and physics lab sections.
- 2005-2006: Graduate Teaching Assistant, University of Arizona: Held office hours, led review sessions, guest-lectured, and graded for ASTR 203: Astronomy of Stars – won teaching award detailed below. Graded for NATS 102: Beyond the Earth in Space and Time, a very large introductory course for non-majors.

Awards and Fellowships:

- 2006: University of Arizona, Astronomy Department Outstanding Graduate Teaching Assistant Award.
- 1999: Caltech/JPL SURF (Summer Undergraduate Research Fellowship)

Academic Service:

- 2017-2018: Served on the University of Hawaii telescope allocation committee, which is responsible for evaluating observing proposals and awarding observing time on the world-class telescopes on Maunakea, including Keck I and II, Gemini North, Subaru, the Canada France Hawaii Telescope, and others.
- 2013-2015: Organized and led weekly 'astro-ph pizza' lunches for the Astronomy Department of Stony Brook University, in which interested students and faculty met to discuss the latest astrophysics papers posted to arxiv.org.

Outreach and Astronomy Education:

- 2019: On April 30, gave a talk entitled, “Finding Them All: The End of the Asteroid Threat?” to a meeting of the Federal 9th Circuit judges at the Royal Hawaiian hotel in Honolulu. Described asteroid surveys, their progress in retiring risk from remaining undiscovered near-Earth asteroids, and the changing character of the risk.
- 2016-2019: Provided views of Jupiter, Saturn, and other astronomical objects to attendees of Maili Bible Church family camp, using my personal 20-inch telescope. I offered viewing on multiple clear nights of the four-day camp each summer, answering questions and discussing astronomy far into the night.
- 2015-present: Gave interviews and assisted with press releases and popular science articles to inform the public about the ATLAS asteroid survey.
- 2009: Provided an astronomy night at Steven F. Austin State Park, for homeschooled students from the Houston, TX area using my personal 20-inch telescope.

- 2007: Provided an astronomy night to students from Wallingford Elementary School using the telescopes of Swarthmore College.
- 2007: Spoke on Astronomy and Religion at Proclamation Presbyterian Church in Bryn Mawr, PA.
- 1995-present: Organize occasional stargazing trips for friends and acquaintances using my increasingly powerful personal telescopes. I always combine telescopic views of astronomical objects with basic explanations of their nature and characteristics.

Peer Reviewed Publications:

Heinze, A. N.; Trollo, Joseph; and Metchev, Stanimir 2019: "The Flux Distribution and Sky Density of 25th Magnitude Main Belt Asteroids," *Astronomical Journal*, 158, 232

Holoien, T. W.-S.; and 43 co-authors including **Heinze, A. N.** 2019: "**PS18kh: A New Tidal Disruption Event with a Non-axisymmetric Accretion Disk**," *Astrophysical Journal*, 880, 120

Kleyna, Jan T.; and 17 co-authors including **Heinze, A. N.** 2019: "**The Sporadic Activity of (6478) Gault: A YORP-driven Event?**," *Astrophysical Journal Letters*, 874, 20

Dimitriadis, G.; and 161 co-authors including **Heinze, A. N.** 2019: "**K2 Observations of SN 2018oh Reveal a Two-component Rising Light Curve for a Type Ia Supernova**," *Astrophysical Journal Letters*, 870, 1

Shappee, B. J.; and 123 co-authors including **Heinze, A. N.** 2019: "**Seeing Double: ASSASN-18bt Exhibits a Two-component Rise in the Early-time K2 Light Curve**," *Astrophysical Journal*, 870, 13

Li, W.; and 178 co-authors including **Heinze, A. N.** 2019: "**Photometric and Spectroscopic Properties of Type Ia Supernova 2018oh with Early Excess Emission from the Kepler 2 Observations**," *Astrophysical Journal*, 870, 12

Chen, T.-W.; and 48 co-authors including **Heinze, A. N.** 2018: "**SN 2017ens: The Metamorphosis of a Luminous Broadlined Type Ic Supernova into an SN IIn**," *Astrophysical Journal Letters*, 867, 31

Tucker, M. A.; and 26 co-authors including **Heinze, A. N.** 2018: "**ASASSN-18ey: The Rise of a New Black Hole X-Ray Binary**," *Astrophysical Journal Letters*, 867, 9

Tonry, J. L.; Denneau, L.; Flewelling, H.; **Heinze, A. N.**; Onken, C. A.; Smartt, S. J.; Stalder, B.; Weiland, H. J.; and Wolf, C. 2018: "**The ATLAS All-Sky Stellar Reference Catalog**," *Astrophysical Journal*, 867, 105

Heinze, A. N.; Tonry, John L.; Denneau, Larry; Flewelling, Heather; Stalder, Brian; Rest, Armin; Smith, Ken W.; Smartt, Stephen J.; and Weiland, Henry 2018: "**A First Catalog of Variable Stars Measured by the Asteroid Terrestrial-impact Last Alert System (ATLAS)**," *Astronomical Journal*, 156, 241

Anderson, J. P.; and 65 co-authors including **Heinze, A. N.**, 2018: "**A nearby super-luminous supernova with a long pre-maximum & "plateau" and strong C II features**," *Astronomy and Astrophysics*,

Prentice, S. J.; and 29 co-authors including **Heinze, A.** 2018: “**The Cow: Discovery of a Luminous, Hot, and Rapidly Evolving Transient,**” *Astrophysical Journal Letters*, 865, 3

Tonry, J. L.; Denneau, L.; **Heinze, A. N.**; Stalder, B.; Smith, K. W.; Smartt, S. J.; Stubbs, C. W.; Weiland, H.J.; and Rest, A. 2018: “**ATLAS: A High-cadence All-sky Survey System,**” *Publications of the Astronomical Society of the Pacific*, 130, 4505

Pastorello, A.; and 54 co-authors including **Heinze, A.** 2018; “**Supernovae 2016bdu and 2005gl, and their link with SN 2009ip-like transients: another piece of the puzzle,**” *Monthly Notices of the Royal Astronomical Society*, 474, 197

Kuncarayakti, Hanindy; and 44 co-authors including **Heinze, Ari** 2018: “**SN 2017dio: A Type-Ic Supernova exploding in a Hydrogen-rich Circumstellar Medium,**” *Astrophysical Journal Letters*, 854, 14

Stalder, B.; and 28 co-authors including **Heinze, A.** 2017: “**Observations of the GRB Afterglow ATLAS17aeu and Its Possible Association with GW 170104,**” *Astrophysical Journal*, 850, 149

Smartt, S. J.; and 121 co-authors including **Heinze, A.** 2017: “**A kilonova as the electromagnetic counterpart to a gravitational-wave source,**” *Nature*, 551, 75

Kellogg, Kendra; Metchev, Stanimir; **Heinze, Aren**; Gagné, Jonathan; and Kurtev, Radostin 2017, “**Characterizing the Cloud Decks of Luhman 16AB with Medium-resolution Spectroscopic Monitoring,**” *Astrophysical Journal*, 849, 72

Abbott, B. P. and 3676 co-authors including **Heinze, A.** 2017: “**Multi-messenger Observations of a Binary Neutron Star Merger,**” *Astrophysical Journal*, 848, L12

Miles-Páez, Paulo A.; Metchev, Stanimir A.; **Heinze, Aren**; and Apai, Daniel 2017: “**Weather on Other Worlds. IV. H α Emission and Photometric Variability Are Not Correlated in L0-T8 Dwarfs,**” *Astrophysical Journal*, 840, 83

Arcavi, Iair and 19 co-authors including **Heinze, Ari** 2017: “**Constraints on the Progenitor of SN 2016gkg from Its Shock-cooling Light Curve,**” *Astrophysical Journal*, 837, L2

Patel, Rahul I.; Metchev, Stanimir A.; **Heinze, Aren**; and Trollo, Joseph 2017: “**The Faintest WISE Debris Disks: Enhanced Methods for Detection and Verification,**” *Astronomical Journal*, 153, 54

Smartt, S. J. and 50 co-authors including **Heinze, A.** 2016: “**Pan-STARRS and PESSTO search for an optical counterpart to the LIGO gravitational-wave source GW150914,**” *Monthly Notices of the Royal Astronomical Society*, 462, 4094

Smartt, S. J. and 39 co-authors including **Heinze, A.** 2016: “**A Search for an Optical Counterpart to the Gravitational-wave Event GW151226,**” *Astrophysical Journal*, 827, 40

Heinze, Aren N.; Metchev, Stanimir; and Kellogg, Kendra 2015: “**Weather on Other Worlds. III. A Survey for T Dwarfs with High Amplitude Optical Variability,**” *Astrophysical Journal*, 801, 104

Metchev, Stanimir; **Heinze, Aren**; Apai, Daniel; Flateau, Davin; Radigan, Jacqueline; Burgasser, Adam; Marley, Mark; Artigau, Étienne; Plavchan, Peter; and Goldman, Bertrand 2015: “**Weather on Other Worlds. II. Survey Results: Spots are Ubiquitous on L and T Dwarfs,**” *Astrophysical Journal*, 799, 154

Heinze, Aren N., Metchev, Stanimir A., and Trollo, Joseph 2015: “**Digital Tracking Observations Discover Asteroids Ten Times Fainter than Conventional Searches,**” *Astronomical Journal*, 150, 125

Heinze, Aren N. and Metchev, Stanimir A. 2015: “**Precise Distances for Main-Belt Asteroids in Only Two Nights ,**” *Astronomical Journal*, 150, 124

Yang, Hao and 16 co-authors including Heinze, Aren N. 2015: “**HST Rotational Spectral Mapping of Two L-Type Brown Dwarfs: Variability in and out of Water Bands Indicates High-altitude Haze Layers,**” *Astrophysical Journal* 798, 13

Patel, Rahul I.; Metchev, Stanimir A.; and **Heinze, Aren** 2014: “**A Sensitive Identification of Warm Debris Disks in the Solar Neighborhood through Precise Calibration of Saturated WISE Photometry,**” *Astrophysical Journal Supplement Series*, 212, 10

Heinze, Aren N.; Metchev, Stanimir; Apai, Daniel; Flateau, Davin; Kurtev, Radostin; Marley, Mark; Radigan, Jacqueline; Burgasser, Adam J.; Artigau, Étienne; Plavchan, Peter 2013: “**Weather on Other Worlds. I. Detection of Periodic Variability in the L3 Dwarf DENIS-P J1058.7-1548 with Precise Multi-wavelength Photometry,**” *Astrophysical Journal*, 767, 173

Hinz, Philip M.; Rodigas, Timothy J.; Kenworthy, Matthew A.; Sivanandam, Suresh; **Heinze, Aren N.**; Mamajek, Eric E.; Meyer, Michael R. 2010: “**Thermal Infrared MMTAO Observations of the HR 8799 Planetary System,**” *Astrophysical Journal*, 716, 417

Heinze, A. ; Hinz, Philip M.; Kenworthy, Matthew; Meyer, Michael; Sivanandam, Suresh; Miller, Douglas 2010: “**Constraints on Long-period Planets from an L'- and M-band Survey of Nearby Sun-like Stars: Modeling Results,**” *Astrophysical Journal*, 714, 1570

Heinze, A. N.; Hinz, Philip M.; Sivanandam, Suresh; Kenworthy, Matthew; Meyer, Michael; Miller, Douglas 2010: “**Constraints on Long-period Planets from an L'- and M-band Survey of Nearby Sun-like Stars: Observations,**” *Astrophysical Journal*, 714, 1551

Heinze, A. N.; de Lahunta, Daniel 2009: “**The Rotation Period and Light-Curve Amplitude of Kuiper Belt Dwarf Planet 136472 Makemake (2005 FY9),**” *Astronomical Journal* 138, 428

Kenworthy, Matthew A.; Mamajek, Eric E.; Hinz, Philip M.; Meyer, Michael R.; **Heinze, Aren N.**; Miller, Douglas L.; Sivanandam, Suresh; Freed, Melanie 2009: “**MMT/AO 5 μ m Imaging Constraints on the Existence of Giant Planets Orbiting Fomalhaut at \sim 13-40 AU,**” *Astrophysical Journal*, 697, 1928

Heinze, A. N.; Hinz, Philip M.; Kenworthy, Matthew; Miller, Douglas; Sivanandam, Suresh 2008: “**Deep L'- and M-band Imaging for Planets around Vega and ϵ Eridani,**” *Astrophysical Journal*, 688, 583

Kenworthy, Matthew A.; Codona, Johanan L.; Hinz, Philip M.; Angel, J. Roger P.; **Heinze, Ari**; Sivanandam, Suresh 2007, “**First On-Sky High-Contrast Imaging with an Apodizing Phase Plate,**” *Astrophysical Journal*, 660, 762

Hinz, Philip M.; **Heinze, A. N.**; Sivanandam, Suresh; Miller, Douglas L.; Kenworthy, Matthew A.; Brusa, Guido; Freed, Melanie; Angel J. R. P. 2006, “**Thermal Infrared Constraint to a Planetary Companion of Vega with the MMT Adaptive Optics System,**” *Astrophysical Journal*, 653, 1486

Heinze, A. N.; Hinz, Philip M. 2005: “**Spectral Types for Four OGLE-III Transit Candidates: Could These Be Planets?**” *Astronomical Journal*, 130, 1929

Buratti, B J.; Hillier, J. K.; **Heinze, A.**; Hicks, M. D.; Tryka, K. A.; Mosher, J. A.; Ward, J.; Garske, M.; Young, J.; Atienza-Rosel, J. 2003: “**Photometry of Pluto in the last decade and before: evidence for volatile transport?**” *Icarus*, 162, 171

Ph.D. Dissertation: University of Arizona, 2007. Advisor: **Dr. Philip M. Hinz:** “Planets Around Solar-Type Stars: Methods for Detection and Constraints on their Distribution from an L' and M band Adaptive Optics Imaging Survey.”

Conference Presentations:

Heinze, Aren; Tonry, John L.; Denneau, Larry; and Stalder, Brian: “**ATLAS simulation results point to a dangerous class of asteroids that is nearly invisible**” September 2019: *American Astronomical Society, Division for Planetary Sciences 50th meeting*, Geneva, Switzerland

Heinze, Aren N.; Tonry, John; Denneau, Larry; and Stalder, Brian: “**Large Surveys Find Extreme Objects: A Case Study from the ATLAS Variable Star Catalog**” [2019AAS...233.41802], January 2019: *American Astronomical Society 233rd meeting*, Seattle, WA, USA

Heinze, Aren; Denneau, Larry; and Tonry, John: “**The Number Density of Near Earth Asteroids in Position/Velocity Phase Space**” [2018AOGS...PS20-A005], June 2018, *Asia Oceania Geosciences Society 15th meeting*, Honolulu, HI, USA

Heinze, Aren N.; Tonry, John; Denneau, Larry; and Stalder, Brian: “**All-Sky Census of Variable Stars from the ATLAS Survey**” [2018AAS...231.10904], January 2018: *American Astronomical Society 231st meeting*, Washington, D.C., USA

Heinze, Aren; Tonry, John L.; Denneau, Larry; and Stalder, Brian: “**ATLAS: Finding the Nearest Asteroids**” [2017DPS...49.10304], October 2017: *American Astronomical Society, Division for Planetary Sciences 49th meeting*, Provo, UT, USA

Heinze, Aren; Tonry, John; Denneau, Larry; Stalder, Brian; Sherstyuk, A.; Rest, A.; Smith, K. W.; and Smartt, S. J.: “**Guard Earth, but Monitor the Universe: ATLAS and the Variable Sky**” [2017AAS...229.22302], January 2017: *American Astronomical Society 229th meeting*, Grapevine, TX, USA

Heinze, Aren N., Metchev, Stanimir, and Kellogg, Kendra: “**T Dwarf Variability Amplitudes Are Likely Stronger in the Optical**” [2015AAS...225.13007], January 2015: *American Astronomical Society 225th meeting*, Seattle, WA, USA

Heinze, Aren N., and Metchev, Stanimir: “**Digital Tracking Observations Discover Asteroids Ten Times Fainter than Conventional Searches**” [2014DPS...46.41420], November 2014: *American Astronomical Society, Division for Planetary Sciences 46th meeting*, Tucson, AZ, USA

Heinze, Aren N. and Metchev, Stanimir: “**Wild Weather: Brown Dwarfs with Dynamic, Rapidly Changing Clouds,**” June 2014: *18th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun*, Flagstaff, AZ, USA

Heinze, Aren and Metchev, S. “**Unusual Slowly Rotating Brown Dwarfs Discovered through Precision Spitzer Photometry**” [2014AAS...223.33404], January 2014: *American Astronomical Society 223rd meeting*, Washington, DC, USA

Heinze, Aren: “**Iron Storms and Sunless Aurorae: The Wild Weather of Brown Dwarfs,**” September 2013: **invited review** at *Mind the Gap: Exoplanets and Brown Dwarfs*, University of Hertfordshire, Hatfield, United Kingdom.

Heinze, Aren: “**Towards an Understanding of Brown Dwarf Weather: First Results from a Spitzer/IRAC Variability Survey**” June 2012: *17th Cambridge Workshop on Cool Stars, Stellar Systems and the Sun*, Barcelona, Spain.

Heinze, Aren; Hinz, P. M.; Sivanandam, S. “**Bright Binaries with Adaptive Optics: from Instrument Calibration to Orbital Science**” [2009AAS...213.43210], January 2009: *American Astronomical Society 213th meeting*, Long Beach, CA, USA

Heinze, Aren; Hinz, P.; Sivanandam, S.; Kenworthy, M. “**How to Image Epsilon Eridani b**” [2008 AAS...212.4403], June 2008: *American Astronomical Society 212th meeting*, St. Louis, MO, USA

Heinze, A.; Vilas, F.; Hinz, P.; Kenworthy, M. “**MMT Adaptive Optics Images of Vesta in L' and M' During the 2007 Apparition**” [2008LPICo1405.8286], July 2008: *Asteroids, Comets, and Meteors*, Baltimore, MD, USA

Heinze, Aren; Hinz, P.; Sivanandam, S.; Meyer, M. “**An L' and M-band AO Imaging Survey for Extrasolar Giant Planets: Progress and Preliminary Results**” [2006AAS...209.22603], January 2007: *American Astronomical Society 209th meeting*, Seattle, WA, USA

Heinze, Ari; Hinz, Phil; Sivanandam, Suresh; Apai, Daniel; Meyer, Michael. “**High contrast L' band adaptive optics imaging to detect extrasolar planets**” [2006SPIE.6272E.121H], May 2006: *SPIE Astronomical Telescopes Symposium*, Orlando, FL, USA

Sivanandam, Suresh; Hinz, Phil M.; **Heinze, Ari N.;** Freed, Melanie; Breuninger, Andrew H. “**Clio: a 3-5 micron AO planet-finding camera**” [2006SPIE.6269E..27S], May 2006: *SPIE Astronomical Telescopes Symposium*, Orlando, FL, USA

Heinze, Aren N.; Hinz, Philip M.; McCarthy, Donald W., Jr. “**A 3-5 Micron Camera for Extrasolar Planet Searches**” [2003SPIE.4839.1154H], August 2002, *SPIE Astronomical Telescopes and*

Instrumentation Symposium, Waikoloa, HI, USA