

Aren (Ari) N. Heinze

Postdoctoral Researcher
Department of Physics and Astronomy
Stony Brook University
Stony Brook, NY 11794-3800, USA

Education:

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

Research Experience:

- 2011-present: Postdoctoral Researcher, Stony Brook University: Studying clouds in brown dwarf atmospheres through multi-wavelength photometric monitoring using Spitzer and ground-based telescopes, in collaboration with Stanimir Metchev and others. Beginning 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)

Outreach and Astronomy Education:

- 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, 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*, in press

Metchev, Stanimir; **Heinze, Aren**; Apai, Daniel; Fplateau, 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. and Metchev, Stanimir A. 2015: “**Digital Tracking Observations Discover Asteroids Ten Times Fainter than Conventional Searches,**” *Astronomical Journal*, in preparation

Patel, Rahul I.; Metchev, Stanimir A.; and **Heinze, Aren** 2014: “**A WISE Study of Debris Disk Detections in the Solar Neighborhood,**” *Astrophysical Journal Supplement Series*, 212, 10

Heinze, Aren N.; Metchev, Stanimir; Apai, Daniel; Fplateau, 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 ~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.”

Selected Conference Presentations:

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

Recent Talks:

“Finding the Faintest Asteroids Ever Imaged: Methodology and Anticipated Scientific Returns,” invited seminar, September 3, 2014, **Stony Brook University**, Stony Brook, New York, USA

“Boulders in the Main Belt: How to Find the Faintest Asteroids,” invited seminar, April 2, 2014, **Universidad de Valparaiso**, Valparaiso, Chile

“Finding the Faintest Asteroids Ever Imaged: Methodology and Anticipated Scientific Returns,” invited seminar, January 31, 2014, **University of Western Ontario**, London, Ontario, Canada

“Iron Storms and Silicate Blizzards: The Wild Weather of Brown Dwarfs (with a detour into asteroid detection),” journal club talk, October 11, 2013, **Stony Brook University**, Stony Brook, New York, USA

“Iron Storms and Silicate Blizzards: The Wild Weather of Brown Dwarfs,” invited seminar, September 17, 2013, **American Museum of Natural History**, New York, New York, USA

“Iron Rain and Sunless Aurorae: The Wild Weather of Brown Dwarfs,” invited seminar, March 5, 2013, **University of Delaware**, Newark, Delaware, USA

Other Achievements and Endeavors:

2011-present: Continuing to sell *The Epic of Karolan* through my sole proprietorship publishing business, Hopewriter Publishing. About 3,500 books sold from 2009-2012.

2013: Designed and built 11.5 foot wooden rowboat with matching oars; demonstrated passenger capacity greater than 500 lbs with excellent stability in the presence of waves.

2008-2012: Wrote a science fiction book, *Depths of the Heavens*, and two children's stories, *Maylie and the Dwarf* and *Foggy Florida: a Story of Preposterous Predictions*. These works should be published through Hopewriter Publishing in 2015.

2009-2011: Edited and published my four-book fantasy novel, *The Epic of Karolan*, through Hopewriter Publishing. This involved learning all aspects of the publishing business, including small business operations, book design and production, inventory management, advertising, and fulfillment.

2009: Started Hopewriter Publishing, a sole proprietorship publishing business.

1999-2005: Wrote a long fantasy novel, *The Epic of Karolan*.

2004: Built a rich-field binocular telescope consisting of two 8-inch F/5 Newtonian reflectors on a mount that carries the observer on a seat between the telescopes, allowing an unusually comfortable, starship-like observing experience.

2002:

Planned and executed a 4-day backpacking trip up Mauna Loa, which included the remarkable experience of traversing cooled lava flows from relatively recent (1980's) eruptions – harsh landscapes of rock younger than myself.