

# NATHANIEL E. Q. PAUST

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## TEACHING

- 2009 – ASSOCIATE PROFESSOR OF ASTRONOMY, WHITMAN COLLEGE
- Taught during the 2009-2010 school year as a visiting professor and was hired for a tenure-track position before the 2010-2011 school year. Promoted to associate professor with tenure in 2015.
  - Taught a six, or more, course load of classes ranging from introductory astronomy for non-science majors to stellar astrophysics, tailoring the courses to very talented students. (Whitman policy states that 5.0 courses in a normal load.)
  - Using both archival and new data, have led multiple student research groups to present research at the meetings of the Astronomical Society of America and submit papers.
  - Created new courses covering the birth and evolution of stars in star clusters, observational techniques, and senior seminar.
  - Currently batting 100% getting Astronomy-Physics majors into graduate school.
- 2007 – 2009 ADJUNCT INSTRUCTOR, LOYOLA COLLEGE OF MARYLAND
- Established curriculum for the college's introductory astronomy course covering material ranging from historical astronomy to planetary astronomy to stellar evolution to cosmology.
  - Incorporated both active learning exercises (discussion-based classes, in-class laboratory exercises and student presentations) and traditional lectures.
- 2001 – 2006 TEACHING & RESEARCH ASSISTANT, DARTMOUTH COLLEGE
- Pioneered new methods in simultaneous age/distance determination for globular clusters.
  - Became adept at crowded-field photometry using DAOPHOT/ALLSTAR and well versed in the use of other astronomical packages such as IRAF and SEXTRACTOR.
  - Experienced (typically ~20 nights/year) using large astronomical telescopes in both hemispheres (MDM Hiltner 2.4m telescope at Kitt Peak and the LCO DuPont 100" telescope in Chile) in the optical and IR as well as the Hubble Space Telescope.
  - Awarded a NSF GAANN fellowship for 2004-2005.
  - Instructed undergraduate laboratory courses including the honors physics labs. Graded and served as a substitute instructor for a range of graduate and undergraduate physics and astronomy courses. Sponsored a Women in Science Project intern for 2006.
- 2000 – 2001 LECTURER, EDMONDS COMMUNITY COLLEGE AND HIGHLINE COMMUNITY COLLEGE
- Established curriculum and labs for an intro-level 50-student planetary astronomy course and a general astronomy course.
  - Developed curriculum and instructed a first-year non-calculus based physics course for approximately 50 students.
- 1998 – 2000 TEACHING & RESEARCH ASSISTANT, NEW MEXICO STATE UNIVERSITY
- Interpreted data from the ESA Hipparcos Satellite and used stellar isochrone fitting software to determine the star formation history of the local Galaxy.
  - Assisted with visualization of data from the NASA/Ames Mars Global Climate Model.
  - Instructed over 50 students per semester in the introductory astronomy lab and prepared coursework and oversaw student development in departmental classes.
  - Served as substitute instructor for planetary and general astronomy classes on a regular basis

## EDUCATION AND RESEARCH

- 2006 – 2009 POST-DOCTORAL FELLOW, SPACE TELESCOPE SCIENCE INSTITUTE
- Led first large homogeneous study of correlations between globular cluster mass function slope and cluster environmental and internal parameters.
  - Extensively analyzed luminosity and mass functions, including dynamical modeling, for 65 globular clusters in the HST/ACS Survey of Galactic Globular clusters.
  - Gained detailed experience with HST data and extended expertise in crowded-field photometry with specialized methods for HST images.
  - Supervised a research intern examining star counting statistics and ideal methods for determining globular cluster distances and ages.
- 2001 – 2006 PH.D., DARTMOUTH COLLEGE, HANOVER, NH  
Dissertation Title: *Testing Stellar Evolution Models with Globular Clusters*  
Advisor: Brian Chaboyer  
Coursework: Mechanics, E&M, Stellar Astrophysics, Observational Cosmology, the ISM
- 1998 – 2000 M.S., NEW MEXICO STATE UNIVERSITY, LAS CRUCES, NM  
Thesis Title: *The Star Formation History of the Local Milky Way*  
Advisor: Jon Holtzman  
Coursework: Fluid Mechanics, Radio Astronomy, Galactic Dynamics, Galaxy Evolution, Radiative Transfer
- 1994 – 1998 B.A., WHITMAN COLLEGE, WALLA WALLA, WA  
Major: Physics and Astronomy (combined)  
Coursework: Math, German, Philosophy and Art  
Graduated 44th out of 356 with a GPA of 3.69

## RESEARCH INTERESTS

My research interests revolve around using large high-precision datasets to answer interesting astronomical questions. In the case of globular clusters this has led me to examine the color magnitude diagrams, luminosity functions, mass functions, and now cluster dynamics. This work is particularly interesting now that it appears many objects called “globular clusters” are not globular clusters at all. My current research uses dynamical models to determine if the observed differences in GCs are intrinsic to the clusters or if the differences have come from stellar and cluster evolution over the last 10-13 billion years. Additionally, I have been using the methods established in my doctoral work to involve students in real publication-quality research.

I plan to extend this research in two ways in future years. First, it would be extremely interesting to determine if there are accurate tracers the globular cluster ages that could be found in integrated light measurement or spectra allowing analysis to extend to globular clusters beyond the Milky Way. The dynamical modeling of clusters has also led me to the realization that all published GC tidal radii are the result of extrapolating models rather than direct observation. I am extremely interested in undertaking an observing project to make the first direct measurement of a GC tidal radii, possibly using APOGEE results to test whether current results are, in fact, correct. I’m also very interested in using cluster mass and luminosity functions to categorize objects and explain phenomena such as multiple main sequences in clusters.

Finally, one of my passions is teaching and researching methods to maximize student interest and retention of course material, specifically in the undergraduate realm.

## PUBLICATIONS

- Selected Papers:
- Barker & Paust, 2018, PASP, 130, 034204 *Isochrone Fitting of Hubble Photometry in the UV-VIS-IR Bands*
  - Paust, Wilson, & van Belle 2014, AJ, 148, 19 *Reinvestigating the Clusters Koposov 1 and 2*
  - Tucker & Paust, 2012, ASP Conference Series, Vol. 457, Connecting People to Science, 359 *Teaching the Moon: A Study of Teaching Methodology Across Age Groups*
  - Milone et al. 2012, A&A, 540, 16 *The ACS Survey of Galactic Globular Clusters. XII. Photometric Binaries on the Main Sequence*
  - Siegel et al. 2011, ApJ, 743, 20 *The ACS Survey of Galactic Globular Clusters. XI. The Three-Dimensional Orientation of the Sagittarius Dwarf Spheroidal Galaxy and Its globular Clusters*
  - Paust, N. E. Q., et al. 2010, AJ, 139, 476 *The ACS Survey of Galactic Globular Clusters. VIII. Effects of Environment on Globular Cluster Global Mass Functions*
  - Dotter, A., et al. 2010, ApJ, 708, 698 *The ACS Survey of Galactic Globular Clusters. IX. Horizontal Branch Morphology and the Second Parameter Phenomenon*
  - Marín-Franch, A., et al. 2009, ApJ, 694, 1498 *The ACS Survey of Galactic Globular Clusters. VII. Relative Ages*
  - Paust, N. E. Q., 2009, “The Biggest, Baddest, Coolest Stars” ASP Conference Series, Vol 412, eds. Luttermoser, D., Smith, B., & Stencel, R., *Simultaneous Age and Distance Determination using the RGB*
  - Paust, N. E. Q., et al. 2009, AJ, 137, 246 *The ACS Survey of Galactic Globular Clusters. VI. NGC 6366: A Heavily Stripped Galactic Globular Cluster*
  - Anderson, J., et al. 2008, AJ, 135, 2055 *The ACS Survey of Globular Clusters V: Star Catalog for Each Cluster*
  - Richer, H. B., et al. 2008, AJ, 135, 2141, *ACS Imaging of the Globular Cluster NGC 6397: The Cluster Color Magnitude Diagram and Luminosity Function*
  - Paust, N. E. Q., Chaboyer, B., & Sarajedini, A. 2007, AJ, 133, 2787, *The Luminosity Function of M92*
  - Lewis, M.S., Liu, W. M., Paust, N. E. Q., & Chaboyer, B. 2006, AJ, 131, 2538, *A New Color-Magnitude Diagram for Palomar 11*
- Selected Posters:
- Paust, N.E.Q., Nevin, R., & Chaboyer, B. 2012, AAS Winter Meeting, *New BVI Photometry of Pal 13*
  - Paust, N.E.Q. & Chaboyer, B. 2011, AAS Winter Meeting, *RGB Luminosity Functions for M2, M3, and M14*
  - Feuillet, D. Borland, B., Paust, N. E. Q., Dobson, A., & Chaboyer, B. 2009, AAS Winter Meeting, *BV Photometry of M15*
  - Paust, N. E. Q., Aparicio, A., Piotto, G., & Reid, I. N. 2008, AAS Winter Meeting, *New Global Mass Functions and Structural Parameters for Galactic Globular Clusters*
  - Paust, N. E. Q., Reid, I. N., Aparicio, A., Piotto, G. 2007, AAS Winter Meeting, *The HST/ACS Survey of Galactic Globular Clusters: Luminosity and Mass Functions*
  - Paust, N. E. Q., & Chaboyer, B. 2006, AAS Winter Meeting, *The Luminosity Function of M14*
  - Paust, N. E. Q., Chaboyer, B., & McWilliam, A. 2005, AAS Winter Meeting, *Wide-Field JHKs Photometry of M5*
  - Chaboyer, B., Bjork, S. R., & Paust, N. E. Q. 2004, Canadian Astronomical Society Meeting, *Testing Stellar Evolution Theory: Theoretical Luminosity Functions and M92*

- Selected Talks:
- “The MFs of the multiple main sequences of NGC 2808” Pacific Northwest Astronomy Conference, Bellingham, WA, October 2016
  - “How Stars Work.”, St. Mary’s Hospital Continuing Education Program, Walla Walla, May 2012
  - “The Importance of the Greek System to Whitman.” **KAΘ** Scholarship Meeting, April 2012
  - “What is astronomy good for?”, Whitman College Public Observing Night, September 2011
  - “Globular Clusters: The Most Important Objects in the Galaxy”, The Evergreen State University, Invited Talk, May 2009
  - “Correlations with Galactic Globular Cluster Mass Functions”, Space Telescope Science Institute Colloquium, August 2008
  - “Simultaneous Age and Distance Modulus Determination for Galactic Globular Clusters” Eastern Tennessee State University, Invited Keynote address: Cool Stars Conference, July 2007
  - “What you can learn from counting, LFs and MFs of globular clusters” Johns Hopkins University, CAS Seminar, March 2007
  - “The Formation and Characteristics of the Solar System” Towson University, Astronomy 161, November 2006

#### OTHER INTERESTS

Landscape and large-format photography, linux system administration, gardening, woodworking

#### REFERENCES

Available upon request.