

BENJAMIN NELSON

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EMPLOYMENT

Northwestern University September 2015 - present
Position: Data Science Scholar
Affiliations: Center for Interdisciplinary and Exploratory Research in Astrophysics (CIERA), Northwestern Institute for Complex Systems (NICO)

EDUCATION

Pennsylvania State University August 2013 - August 2015
Ph.D. in Astronomy & Astrophysics received in 2015
Advisor: Dr. Eric Ford
Dissertation: *Statistical and Dynamical Remastering of Classic Exoplanet Systems*

University of Florida August 2009 - July 2013
M.Sc. in Astronomy received in 2011
Advisor: Dr. Eric Ford

University of California, Santa Cruz September 2005 - June 2009
B.Sc. in Physics (Astrophysics) received in 2009
Advisor: Dr. Greg Laughlin

AWARDS & FELLOWSHIPS

Data Science Scholar at Northwestern University 2015 - present
SETI Institute Travel Award for IAU 2015 2015
AAS International Travel Grant 2015
AAS International Travel Grant 2014
Homer F. Braddock Scholarship 2013
UF Grinter Fellow 2009 - 2012
UCSC Honors Thesis 2009

PAPERS AWAITING PUBLICATION

- *Quantifying the Evidence for a Planet in Radial Velocity Data.*
Nelson, B. E., Ford, E. B., Buchner, J., et al. in prep.
- *Forming Gliese 876 Through Smooth Disk Migration.*
Dempsey, A. M. & **Nelson, B. E.** in prep.
- *Systematic Mischaracterization of Exoplanetary System Dynamical Histories from Model Degeneracy Near Mean-Motion Resonance.*
Boisvert, J. H., **Nelson, B. E.**, & Steffen, J. H. in prep.

PUBLICATIONS

- *Evidence for Two Hot Jupiter Formation Paths*
Nelson, B. E., Ford, E. B., & Rasio, F. A. 2017. AJ, 154, 3

- *The conjectured S-type retrograde planet in ν Octantis: more evidence including four years of iodine-cell radial velocities.*
Ramm, D. J., **Nelson, B. E.**, Endl, M., et al. 2016. MNRAS, 460, 3706
- *An empirically derived three-dimensional Laplace resonance in the Gliese 876 planetary system.*
Nelson, B. E., Robertson, P. M., Payne, M. J., et al. 2016. MNRAS, 455, 2484
- *The california Planet Survey IV: A Planet Orbiting the Giant Star HD 145934 and Updates to 7 Systems With Long-Period Planets.*
Feng, Y., Wright, J. T., **Nelson, B. E.**, et al. 2015. ApJ, 800, 22
- *The 55 Cancri Planetary System: Fully Self-Consistent N-body Constraints and a Dynamical Analysis.*
Nelson, B. E., Ford, E. B., Wright, J. T., et al. 2014. MNRAS, 441, 442
- *RUN DMC: An Efficient, Parallel Code for Analyzing Radial Velocity Observations Using N-body Integrations and Differential Evolution Markov Chain Monte Carlo.*
Nelson, B. E., Ford, E. B., & Payne, M. J., 2014. ApJS, 210, 11
- *Swarm-NG: a CUDA Library for Parallel n-body Integrations with Focus on Simulations of Planetary Systems.*
Dindar, S., Ford, E. B., Juric, M. et al. 2013. New Astronomy, 23, 6
- *Very Low Mass Stellar and Substellar Companions to Solar-like Stars from MARVELS. II. A Short-period Companion Orbiting an F Star with Evidence of a Stellar Tertiary and Significant Mutual Inclination.*
Fleming, S. W., Ge, J., Barnes, R., et al. 2012. AJ, 144, 72
- *Ground-based Multisite Observations of Two Transits of HD 80606b.*
Shporer, A., Winn, J. N., Dreizler, S., et al. 2010. ApJ, 722, 880

NON-ASTRONOMY PUBLICATIONS

- *STEM Penpals: Connecting Students with Scientists*
Nelson, B. E. 2017. Edutopia.
- *Effects of Grain Orientation on Brace Deflection*
Nelson, G. E. & **Nelson, B. E.** 2016. American Lutherie, 127

TALKS

- *Quantifying the Evidence for a Planet in Astronomical Data*
International Microlensing Conference 22. Auckland, New Zealand. January 27, 2018 (contributed)
- *Quantifying the Evidence for a Planet in Radial Velocity Data*
Chicago Exoplanets Meeting. Chicago, Illinois. December 7, 2017 (contributed)
- *Generating RV Signatures with RADVEL and REBOUND*
Extreme Precision Radial Velocities III. State College, Pennsylvania. August 16, 2017 (breakout session)
- *Quantifying the Evidence for a Planet*
Extreme Precision Radial Velocities III. State College, Pennsylvania. August 16, 2017 (**invited**)
- *Evidence for Two Hot Jupiter Formation Paths*
Formation and Dynamical Evolution of Exoplanets. Aspen, Colorado. March 31, 2017 (contributed)

- *Dynamical Complexities of Planetary Systems, Near and Far*
Northwestern University, Wednesdays@NICO Seminar. Evanston, Illinois. February 22, 2017 (**invited**)
- *Bayesian model comparison (with respect to exoplanets)*
GNOME Data Bootcamp at Northwestern. Evanston, Illinois. August 18, 2016 (**invited**)
- *Bayesian model comparison for radial velocity: 1, 2, 3, or many planets?*
Sagan Summer Workshop 2016. Pasadena, California. July 18-22, 2016 (**invited**)
- *Statistical and dynamical remastering of the radial velocity classics*
University of Florida, Astronomy Seminar. Gainesville, FL. January 11, 2016 (contributed)
- *ν Octantis: a conjectured S-Type retrograde planet in a spectroscopic binary system*
AAS Meeting #227. Kissimmee, Florida. January 4-8, 2016 (contributed)
- *More support for the extreme S-type retrograde planet in the spectroscopic binary ν Octantis*
Extreme Solar Systems 3. Waikoloa Beach Resort, Hawaii. December 3, 2015 (contributed)
- *Data analysis techniques for next-generation radial velocity surveys*
MSU Astronomy Seminar. East Lansing, MI. October 28, 2015 (**invited**)
- *Orbital architectures of dynamically complex exoplanet systems*
AAS Meeting #225. Seattle, WA. January 4-8, 2015 (dissertation)
- *A three-dimensional Laplace resonance in Gliese 876*
Bay Area Exoplanet Meeting. Mountain View, CA. December 5, 2014 (contributed)
- *Orbital architectures of dynamically complex exoplanet systems*
UC Santa Cruz FLASH Seminar. December 12, 2014 (**invited**)
Berkeley CIPS Seminar. December 3, 2014 (**invited**)
Yale Astronomy Department, Stellar Tea. October 8, 2014 (**invited**)
Harvard ITC Seminar. September 30, 2014 (**invited**)
- *Joint Bayesian and n-body analyses of the 55 Cancri and GJ 876 planetary systems*
45th DDA Meeting. Philadelphia, PA. April 28 - May 1, 2014 (contributed)
- *Remastering the RV classics: self-consistent dynamical models for the 55 Cnc and GJ 876 planetary systems.*
AAS Meeting #223. Washington, DC. January 6-9, 2014 (contributed)
- *Applications of n-body MCMC to radial velocity observations of exoplanet systems*
Modern Statistical and Computational Method for Analysis of Kepler Data. Durham, NC. June 10-28, 2013 (seminar)
- *A fully self-consistent and dynamically stable solution for the 55 Cnc planetary system*
Exoplanets in Multi-Body Systems in the Kepler Era. Aspen, CO. February 9-15, 2013 (contributed)

PROCEEDINGS, POSTERS, AND OTHER PRESENTATIONS

- *Modeling Hot Jupiter Populations with Stan*
StanCon. Pacific Grove, CA. January 10, 2018. (poster)
- *An empirically derived three-dimensional Laplace resonance in the GJ 876 planetary system*
XXIX IAU General Assembly, Focus Meeting 1. Honolulu, HI. August 10-14, 2015 (poster)
- *Model comparison using Bayes factors computed from MCMC samples: evidence for four planets orbiting GJ 876*
XXIX IAU General Assembly, Focus Meeting 8. Honolulu, HI. August 3-7, 2015 (poster)

- *Statistical weighting procedures for iodine calibrated radial velocity chunks*
Extreme Precision Radial Velocities. New Haven, CT. July 5-8, 2015 (pop presentation + poster)
- *Empirically derived dynamical models for the 55 Cancri and GJ 876 planetary systems.*
Complex Planetary Systems - IAU Symposium 310. Namur, Belgium. July 7-11, 2014 (proceedings + pop presentation + poster)
- *A modern take on an RV classic: an n-body analysis of 55 Cnc.*
From Stars to Life. Gainesville, FL. April 3-6, 2013 (pop presentation + poster)
- *A Modern take on the RV classics: n-body analysis of GJ 876 and 55 Cnc.*
American Astronomical Society Meeting #221. Long Beach, CA. January 6-10, 2013 (poster)
- *The orbital architecture of 55 Cnc: an orbital resonance, Jupiter analog, and transiting Super-Earth.*
Extreme Solar Systems Meeting #2. Jackson, WY. September 11-17, 2011 (poster)
- 2011 Sagan Exoplanet Summer Workshop (pop presentation)
- *Differential evolution MCMC: An algorithm for Bayesian parameter estimation of multi-planet systems.*
American Astronomical Society Meeting #217. Seattle, WA. January 9-13, 2011 (poster)
- 2010 Sagan Exoplanet Summer Workshop (pop presentation)

STUDENT COLLABORATORS

Mark Berger (sophomore, NU)	April 2017 - present
Frederick Pardoe (junior, Evanston Township High School)	June 2016 - present
Adam Dempsey (graduate student, CIERA/NU)	April 2016 - present
Laura Malis (junior, Stevenson High School)	April 2016 - August 2016
Seth Pritchard (undergraduate, UT San Antonio)	October 2013 - May 2015

TEACHING AND OUTREACH

TA for NICO 101: Introduction to Programming for Big Data	Fall 2016, Fall 2017
Astronomy on Tap Chicago chapter "host star"	March 2016 - present
Penpal and for Letters to a Pre-Scientist	December 2015 - present
General outreach events at NU	September 2015 - present
Docent at Penn State Astrofest	July 10-11, 2015
2014 Penn State Astrostatistics Summer School lab instructor	June 11-13, 2014
Guest lecturer for AST4930: Planetary Astronomy	Fall 2012
Guest lecturer for AST7939: Exoplanets	Fall 2010, Fall 2012
Docent at annual UF Starry Night event	2009 - 2012
Teaching assistant for AST1002: Discovering the Universe (4 semesters)	2009 - 2011
Astrobites guest author (http://goo.gl/CQHfS8 , http://goo.gl/5uLH7Z)	

PROFESSIONAL ACTIVITIES AND SERVICE

Organizer of NU Data Science Nights	November 2017 - present
Executive Secretary for NASA ATP17 Panel Review	November 2017
Reviewer for NU DSI's Seed Research Funding Program	May 2017
Poster judge at NU Computational Research Day	Spring 2016, Spring 2017
Organizer of NU Python Project Night	February 2016 - May 2016

Organizer for weekly CIERA Planet Group Meetings	September 2015 - present
Session chair for “Statistical Characterization”: ERES Symposium 2015	May 2015
Organizing committee member: ERES Symposium 2015	May 2015
Undergraduate poster judge at AAS	January 2015
Referee for ApJ, ApJL, AJ, MNRAS	2014 - present
UF Department of Astronomy webmaster	2012 - 2013
Junior member, American Astronomical Society (DDA)	2011 - present