

# Earl Patrick Bellinger

PH.D. CANDIDATE · STELLAR ASTROPHYSICS · MACHINE LEARNING

Max Planck Institute for Solar System Research – Yale University – University of Göttingen

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## EDUCATION

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- Ph.D. Astrophysics**, *International Max Planck Research School, Germany*  
2015–present
- Max Planck Institute for Solar System Research
  - Department of Astronomy, Yale University
  - Institute of Computer Science, University of Göttingen
- Fellow of the National Physical Science Consortium  
Thesis: [Forward and Inverse Problems in Asteroseismology](#)
- M.Sc. Computer Science**, *Indiana University Bloomington*  
2012–2014
- Fellow of the National Physical Science Consortium  
GPA: 3.94/4.0
- B.Sc. Computer Science**, *State University of New York at Oswego*  
**B.Sc. Applied Mathematics**, *ibid.*  
2008–2012
- Honors Thesis: [Multiphase Relations of Magellanic Cloud Cepheids](#)  
GPA: 3.81/4.0 (*summa cum laude*, ranked #1 in computer science)

## RESEARCH POSITIONS

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- MPS** Max Planck Institute for Solar System Research, Germany  
2015–present *Research Assistant & Ph.D. Candidate (asteroseismology)*
- Yale** Department of Astronomy, Yale University  
2016–2017 *Visiting Assistant in Research (stellar astrophysics)*
- IU** School of Informatics & Computing, Indiana University Bloomington  
2013–2015 *Research Assistant (machine learning)*
- NIST** National Institute of Standards and Technology  
2013–2014 *Guest Researcher (data mining)*
- NII** National Institute of Informatics, Tokyo, Japan  
2013 *Research Student (artificial intelligence)*
- NASA** Jet Propulsion Laboratory  
2012 *Summer Undergraduate Research Fellow (Cassini mission to Saturn)*
- UFAL** Physics Institute, Federal University of Alagoas, Brazil  
2011 *NSF Research Student (quantum mechanics)*
- UFSC** Federal University of Santa Catarina, Florianópolis, Brazil  
2010 *NSF Research Student (variable stars)*

## SELECTED TALKS

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- September 2017 **Rocks & Stars II**, Max Planck Institute for Solar System Research
- June 2017 **ERES-III**, Yale University
- May 2016 **6th Aarhus Workshop on Red Giant Branch Modelling**, Germany
- October 2015 **RR Lyrae**, Visegrád, Hungary
- January 2015 **American Astronomical Society**, Seattle, WA
- January 2015 **Delhi Workshop on Variable Stars**, Delhi, India
- January 2014 **Kerala Workshop on Stellar Astrophysics**, Kerala, India
- April 2013 **KUBIC-NII Joint Seminar on Bioinformatics**, Kyoto, Japan

## LANGUAGES

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- Expertise** R, Python, Common LISP, Scheme, Java, MATLAB, Bash, L<sup>A</sup>T<sub>E</sub>X, HTML
- Proficiency** C, Javascript, Perl, SQL, FORTRAN 77/95, CSS
- Familiarity** ActionScript, Assembly, BASIC, C++, Haskell, Mathematica, ML, PHP, Prolog, Ruby, VB
- Natural** English (native), German (college), Portuguese (college), Spanish (novice, high school), Esperanto (novice, self-study)

## ADVANCED SCHOOLS

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- MESA** Summer School on Stellar Evolution  
2016 *U.C. Santa Barbara, CA, USA*
- Azores** International Advanced School in Space Sciences  
2016 *Horta, Faial, Azores Islands, Portugal*

## TEACHING

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- Yale** Teaching Assistant, ASTR 550, [Stellar Astrophysics](#)  
Spring 2017 *Department of Astronomy, Yale University*
- MPS** Assistant, M.Phys.55x.3C, [Numerical Experiments in Stellar Physics](#)  
Summer 2016 *Department of Astrophysics, University of Göttingen*
- IU** Associate Instructor, CSCI-C211, [Introduction to Computer Science](#)  
Fall 2012 *School of Informatics and Computing, Indiana University Bloomington*
- SUNY** Seminar Leader, HON 150, [Introduction to the Honors Program](#)  
Fall 2010 *Honors Program, SUNY Oswego*

## AWARDS & HONORS

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- 2012–2017 National Physical Science Consortium (NPSC) Graduate Fellowship
- 2012 Oebele Van Dyk Outstanding Computer Science Senior Award
- 2012 SUNY Chancellor’s Award for Student Excellence
- 2012 SUNY Oswego Student/Faculty Collaborative Challenge Grant
- 2011 Robert Brian Ellis Scholarship
- 2011 New York State Federation of Home Bureau Scholarship
- 2010–2011 National Science Foundation International Research Experience for Undergraduates / SUNY Oswego Global Laboratory Scholarship (*awarded twice*)
- 2010–2011 U.S. National SMART Grant (*awarded twice*)
- 2008 National Academic Competitiveness Grant (*awarded twice*)
- 2008–2012 SUNY Oswego Presidential Scholarship (*awarded four times*)

## PUBLICATIONS

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### Summary

- 16 papers (9 first author/co-first author)
- 8 refereed articles (3 first/co-first author)
- 7 proceedings papers (5 first author)
- 1 NASA technical report (1 first author)

### Refereed articles

- [8] **Bellinger, E. P.**, Basu, S., Hekker, S., & Ball, W. (2017). Model-independent measurement of internal stellar structure in 16 Cygni A and B. *Accepted for publication in the Astrophysical Journal*.
- [7] **Bellinger, E. P.**, Angelou, G. C., Hekker, S., Basu, S., Ball, W., & Guggenberger, E. (2016). Fundamental Parameters of Main-Sequence Stars in an Instant with Machine Learning. *The Astrophysical Journal*, 830 (1), 20.
- [6] \*Angelou, G. C., \***Bellinger, E. P.**, Hekker, S., & Basu, S. (2017). On the Statistical Properties of the Lower Main Sequence. *The Astrophysical Journal*, 839 (2) 116. (\*co-first author)
- [5] Guggenberger, E., Hekker, S., Basu, S., Angelou, G. C., & **Bellinger, E. P.** (2017). Mitigating the mass dependence in the  $\Delta\nu$  scaling relation of red-giant stars. *Monthly Notices of the Royal Astronomical Society*, 470 (2).
- [4] Guggenberger, E., Hekker, S., Basu, S., & **Bellinger, E. P.** (2016). Significantly improving stellar mass and radius estimates: A new reference function

for the  $\Delta\nu$  scaling relation. *Monthly Notices of the Royal Astronomical Society*, 461 (2).

- [3] Glover, M., **Bellinger, E. P.**, Radivojac, P., & Clemmer, D. (2015). Penultimate Proline in Neuropeptides. *Analytical Chemistry*, 87 (16), 8466-8472.
- [2] Ji, C., Li, Y., **Bellinger, E. P.**, Li, S., Arnold, R., Radivojac, P., & Tang, H. (2015). A maximum-likelihood approach to absolute protein quantification in mass spectrometry. In refereed proceedings of the *6th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics* (pp. 296-305).
- [1] Ngeow, C. C., Kanbur, S. M., **Bellinger, E. P.**, Marconi, M., Musella, I., Cignoni, M., & Lin, Y. H. (2012). Period-luminosity relations for Cepheid variables: from mid-infrared to multi-phase. *Astrophysics and Space Science*, 341(1), 105-113.

### Proceedings papers

- [7] **Bellinger, E. P.**, Angelou, G., Hekker, S., Basu, S., Ball, W., & Guggenberger, E. (2017). Fundamental Parameters in an Instant with Machine Learning: Application to Kepler LEGACY Targets. In proceedings of *Seismology of the Sun and Distant Stars 2016*.
- [6] **Bellinger, E. P.**, Wysocki, D., & Kanbur, S. M. (2015). Measuring amplitudes of harmonics and combination frequencies in variable stars. *Communications from the Konkoly Observatory of the Hungarian Academy of Sciences*, 105.
- [5] **Bellinger, E. P.**, Kanbur, S. M., & Ngeow, C. C. (2012). New insights into the Cepheid PL Relation through the use of multiphase relations. In proceedings of the *20th Stellar Pulsations Conference*.
- [4] **Bellinger, E. P.** (2012). Multiphase Relations of Magellanic Cloud Cepheids. In proceedings of the *2012 National Conference on Undergraduate Research*.
- [3] **Bellinger, E. P.**, Kanbur, S. M., & Ngeow, C. C. (2011). Multiphase Comparison of Period-Luminosity Relations for Magellanic Cloud Cepheids. In proceedings of the *9th Pacific Rim Conference on Stellar Astrophysics*, 451 (311).
- [2] Hekker, S., Elsworth, Y., Basu, S., & **Bellinger, E. P.** (2017). Evolutionary states of red-giant stars from grid-based modelling. In proceedings of *Seismology of the Sun and Distant Stars 2016*.
- [1] Reyner, S., **Bellinger, E. P.**, & Kanbur, S. M. (2012). The approximation of RR Lyrae and eclipsing binary light curves using cubic polynomials. In proceedings of the *20th Stellar Pulsations Conference*.

### Technical reports

- [1] **Bellinger, E. P.**, Conner, D., Mittman, D., Magee, K., & Heventhal, B. (2012). CASSIUS: the Cassini Uplink Scheduler. *JPL: NASA*, hdl:2014/43122.