# Erika M. **Holmbeck**

Nuclear Astrophysicist · Ph.D. Candidate

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## Summary


My interdisciplinary research focuses on understanding heavy-element production through the astrophysical rapid neutron-capture ("*r*"-) process. I observe metal-poor stars with high-resolution spectroscopy and determine elemental abundances from stellar spectra. I also run nucleosynthesis simulations to investigate both the nuclear and astrophysical effects on heavy-element production by the *r*-process.


## Education

*anticipated* **University of Notre Dame**
*2020* Ph.D. Physics
*"The Stellar Actinide Boost and its r-Process Implications"*
Advisors: Profs. Rebecca Surman and Timothy C. Beers

*Feb 2019* M.S. Physics (GPA: 3.94)
*"Characterizing r-Process Sites through Actinide Production"*
Advisors: Profs. Rebecca Surman and Timothy C. Beers

*Jun 2014* **University of California Los Angeles**
B.S. Astrophysics (GPA: 3.81), *Cum laude*, Departmental Honors, Dean's Honors List
*"New Members of Nearby Moving Groups"*
Advisors: Profs. Benjamin Zuckerman and Smadar Naoz

## Research and Teaching Experience

*2015 –* **University of Notre Dame, Department of Physics**
Graduate Research Assistant, Advised by Prof. Rebecca Surman
*r-Process Nucleosynthesis*

Graduate Research Assistant, Advised by Prof. Timothy C. Beers
*Identifying r-II Stars in the Milky Way Halo*

*2019* **Holy Cross College and Westville Correctional Facility**
Teaching Assistant for Prof. Lara Arielle Phillips
*Lab Technician for Westville Education Initiative*

*2015 – 2017* **University of Notre Dame, Department of Physics**
Teaching Assistant for Prof. Peter Garnavich
*Lead Technician for the Jordan Hall of Science Observatory*

*2013 – 2015* **University of California Los Angeles, Department of Physics and Astronomy**
Undergraduate Research Assistant
*Identifying New Members of Nearby Moving Groups*

## Publications

### First Author (4)

*2019* **Actinide-rich and Actinide-poor *r*-Process Enhanced Metal-Poor Stars do not Require Separate *r*-Process Progenitors, Holmbeck, E. M.**, Frebel, A., McLaughlin, G. C., et al. 2019, ApJ, 881, 5.

**Actinide Production in the Neutron-Rich Ejecta of a Neutron Star Merger,** **Holmbeck, E. M.**, Sprouse T. M., Mumpower, M. R., et al. 2019, ApJ, 870, 23.

*2018* **The *R*-Process Alliance: 2MASS J09544277+5246414, the Most Actinide-Enhanced *R*-II Star Known,** **Holmbeck, E. M.**, Beers, T. C., Roederer, I. U., et al. 2018, ApJL, 859, L24.

*2017* **J2038—0023: The First Bright *R*-Process Enhanced Star Identified in the RAVE Survey,** **Holmbeck, E. M.**, Placco, V. M., Beers, T. C., et al., 2017, Proceedings of the 14th Symposium on Nuclei in the Cosmos (NIC2016), 020612.

## Co-Author (10)

*2019* **Using excitation-energy dependent fission yields to identify key fissioning nuclei in *r*-process nucleosynthesis,** Vassh, N., Vogt, R., Surman, R.,Randrup, J., Sprouse, T. M., Mumpower, M. R., Jaffke, P. J., Shaw, D., **Holmbeck, E. M.**, Zhu, Y., McLaughlin, G. C., 2019, Journal of Physics G Nuclear Physics, 46, 065202.

**The R-Process Alliance: Spectroscopic Follow-up of Low-metallicity Star Candidates from the Best & Brightest Survey,** Placco, V. M., Santucci, R. M., Beers, T. C., ..., **Holmbeck, E. M.**, ..., et al., 2019, ApJ, 870, 122.

*2018* **The *R*-Process Alliance: First Release from the Southern Search for *r*-Process Enhanced Stars in the Galactic Halo,** Hansen, T. T., **Holmbeck, E. M.**, Beers, T. C., et al. 2018, ApJ, 858, 92.

**$\beta$-Delayed Fission in *R*-Process Nucleosynthesis,** Mumpower M. R., Kawano T., Sprouse T. M., Vassh N., **Holmbeck, E. M.**, Surman R., Möller P., 2018, ApJ, 869, 14.

**Californium-254 and Kilonova Light Curves,** Zhu, Y., Wollaeger, R. T., Vassh, N., Sprouse, T. M., Mumpower, M. R., Möller, P., McLaughlin, G. C., Korobkin, O., Kawano, T., Jaffke, P. J., **Holmbeck, E. M.**, Fryer, C. L., Even, W. P., Couture, A. J., Barnes, J., 2018, ApJL, 863, L23.

**The *R*-Process Alliance: Discovery of the First Metal-poor Star with a Combined *r*- and *s*-process Element Signature,** Gull, M., Frebel, A., Cain, M. G., Placco, V. M., Ji, A. P., Abate, C., Ezzeddine, R., Karakas, A. I., Hansen, T. T., Sakari, C., **Holmbeck, E. M.**, Santucci, R. M., Casey, A. R., Beers, T. C., 2018, ApJ, 862, 174.

**The *R*-Process Alliance: First Release from the Northern Search for *r*-process-enhanced Metal-poor Stars in the Galactic Halo,** Sakari, C. M., Placco, V. M., Farrell, E. M., ..., **Holmbeck, E. M.**, ..., et al., 2018, ApJ, 868, 110.

**The *R*-Process Pattern of a Bright, Highly *r*-Process-Enhanced, Metal-Poor Halo Star at [Fe/H] $\sim -2$,** Sakari, C. M., Placco, V. M., Hansen, T., **Holmbeck, E. M.**, et al. 2018, ApJL, 854, L20.

**Spectroscopic Validation of Low-metallicity Stars from RAVE,** Placco, V. M., Beers, T. C., Santucci, R. M., Chanamé, J, Sepúlveda, M. P., Coronado, J., Points, S. D., Kaleida, C. C., Rossi, S., Kordopatis, G.; Lee, Y-S., Matijeviç, G., Frebel, A., Hansen, T. T., **Holmbeck, E. M.**, Rasmussen, K. C., Roederer, I. U., Sakari, C. M., Whitten, D. D., 2018, AJ, 155, 256.

*2017* **RAVE J203843.2—002333: The First Highly *r*-Process-Enhanced Star Identified in the RAVE Survey,** Placco, V. M., **Holmbeck, E. M.**, Frebel, A., et al. 2017, ApJ, 844, 18.

## Oral Presentations

*2019* **Fall Meeting of the APS Division of Nuclear Physics** — *Crystal City, VA*
"Actinide-Rich or Actinide-Poor, Same r-Process Progenitor" (contributed)

**Astrophysics Seminar** — *University of Notre Dame, IN*
"The Stellar Actinide Boost and its *r*-Process Implications" (invited)

**JINA-CEE Frontiers in Nuclear Astrophysics** — *Michigan State University, MI*
"Actinide-Rich or Actinide-Poor, Same r-Process Progenitor" (contributed)

**Notre Dame GPS Annual Conference** — *University of Notre Dame, IN*
"Actinide-Boost Stars Might Not Suggest a Separate r-Process Site" (contributed)

***R*-Process Sources in the Universe** — *Arizona State University, AZ*
"Actinide-Boost Stars may not Suggest a Separate *r*-Process Site" (contributed)

*2018* **Fifth Joint Meeting of the Nuclear Physics Divisions of the APS and JPS** — *Waikoloa, HI*
"Actinide Production in Neutron Star Mergers" (contributed)

**JINA-CEE Online Seminar** — *Michigan State University, MI*
"Actinide Production in Neutron Star Mergers: Observation and Theory" (invited)

*2017* **Annual FIRE (Fission In *R*-process Elements) Meeting** — *Lawrence Livermore National Laboratory, CA*
"Impact of New LANL Fission Rates on the *R*-Process" (contributed)

**JINA-CEE Frontiers in Nuclear Astrophysics: Junior Researchers Workshop** — *MSU, MI*
"The Hunt for *r*-II Stars: Constraining the Early *r*-Process through High-Resolution Spectroscopic Follow-up on the RAVE Survey" (contributed)

## Poster Presentations

*2019* **Nuclear Physics in Astrophysics IX** — *Schloß Waldthausen, Frankfurt, Germany*
"Characterizing *r*-Process Sites through Actinide Production" *- Winner of the Best Poster Award*

*2018* **JINA-CEE Frontiers in Nuclear Astrophysics** — *University of Notre Dame, IN*
"The *R*-Process Alliance Hunt for *r*-II Stars"

*2017* **LANL FIESTA Fission School & Workshop** — *Sante Fe, NM*
"Searching for New Highly *r*-Process-Enhanced Stars in the Halo of the Milky Way"

*2016* **Graduate Physics Students (GPS) Fall Conference** — *University of Notre Dame, IN*
"A Bright *r*-II Star Detected by High-Resolution Follow-up of the RAVE Survey"

**Nuclei in the Cosmos XIV** — *Niigata, Japan*
"A Bright *r*-II Star Detected by High-Resolution Follow-up of the RAVE Survey"

*2014* **American Astronomical Society Meeting #224** — *Boston, MA*
"Identifying New Members of Nearby Moving Groups"

## Awards and Fellowships

*2019* **Best Poster Award (Nuclear Physics in Astrophysics IX)** *(500€)*

**Graduate Student Union (GSU) Conference Presentation Grant** *($350)*

*2018* **Zahm Research Travel Grant** *($2,000)*

*2017 –* **Eartly-Lennox Graduate Student Fellow, University of Notre Dame**

*2015 –* **Arthur J. Schmitt Leadership Fellow, University of Notre Dame**

## Skills

*Proficient* Python, LaTeX, bash (Unix/Linux), IRAF, MOOG, SMH
*User-level* C++, Fortran, HTML, CSS

## Student Supervision

*2018* **Phuong Hoang,** University of Hanoi (REU)

**Tino Wells,** University of Washington (REU)

## Memberships

*2016 –* **Joint Institute for Nuclear Astrophysics - Center for the Evolution of the Elements (JINA-CEE)**

*2015 –* **Member of the Society of Schmitt Fellows**

*2015 –* **American Astronomical Society (AAS)**

*2015 –* **American Physical Society (APS)**

## Activities and Outreach

*2019* **Lead Physics lab teaching assistant for the Moreau College Initiative at Westville Correctional Facility**

*2019* **Cofounder and organizer of the JINA-CEE First Frontiers Summer School**

*2017 – 2018* **Graduate Student Union (GSU) Representative for the Department of Physics**

*2017 –* **Private Tutor for Physics I and II**

*2016* **Teaching Assistant for Sensing our World 2016: Mission to Mars**

**Exhibitor for Our Universe Revealed: Hands-On Physics and Astroblast!**

**Exhibitor for JINA-CEE Art 2 Science Camp**