

# Alexander P. Ji

aji@carnegiescience.edu

## EDUCATION AND APPOINTMENTS

---

<b>Hubble Fellow</b> , Observatories of the Carnegie Institution of Washington	Aug 2017 - Present
<b>Ph. D. Physics</b> , Massachusetts Institute of Technology Advised by Anna Frebel, Astrophysics division	Sep 2012 - Jun 2017
<b>M.S. Statistics</b> , Stanford University Focus on Applied Statistics and Machine Learning	Jun 2012
<b>B. S. Physics</b> , Stanford University Minor in Computer Science	Jun 2011

## HONORS AND AWARDS

---

Hubble Fellowship	2017-2020
Martin Deutsch Award for Excellence in Experimental Physics, MIT	Sep 2016
Young Scientist at 66th Lindau Nobel Laureate Meeting, Germany	Jun 2016
Best Poster Prize, Nuclei in the Cosmos XIV, Japan	Jun 2016
Henry Kendall Teaching Award, MIT	Sep 2014
Whiteman Fellow, MIT	Sep 2012 - Aug 2013
Outstanding Learning Assistant, American Association of Physics Teachers	Jun 2012
Stanford Alumni Award of Excellence	Jun 2011
Stanford Physics Undergraduate Commencement Speaker	Jun 2011

## SELECTED TALKS AND POSTERS

---

<b>Invited Talk</b> “Connecting dwarf galaxies to the Milky Way halo”, The Metal-Poor Galaxy	Jul 2018
<b>Invited Talk</b> “r-process nucleosynthesis in dwarf galaxies”, AAS Denver	Jun 2018
<b>Colloquium</b> U. Virginia (Joint Physics/Astronomy)	Feb 2018
<b>Invited Seminar</b> “A rare and prolific r-process event in Reticulum II”, CCAPP/OSU	Oct 2016
<b>Highlight Talk</b> “Dwarf galaxy archaeology with Reticulum II”, First Stars V, Germany	Aug 2016
<b>Invited Talk</b> “A single prolific r-process event preserved in an ultra-faint dwarf galaxy”, American Physical Society Hot Topics Session, April Meeting	Apr 2016
<b>Colloquium</b> “A rare and prolific r-process event in Reticulum II”, University of Toledo	Jan 2016
<b>Talk</b> “Dwarf galaxy archaeology with Reticulum II”, UC Irvine	May 2018
<b>Talk</b> “A full abundance pattern in Reticulum II”, JINA Frontiers	May 2018
<b>Talk</b> “Homogeneous Abundances in Ultra-faint Dwarf Galaxies”, JINA Forging Connections	Jun 2017
<b>Talk</b> “Dwarf galaxy archaeology with Reticulum II”, The Galactic Renaissance	Feb 2017
<b>Seminars</b> “Dwarf galaxy archaeology with Reticulum II”, 7 talks At Caltech, CfA, UCSC, Yale, Carnegie, KIPAC, Tufts	Apr-Nov 2016
<b>Poster</b> “Stellar Abundances in Ultra-faint Dwarf Galaxies”, GMT Science Meeting	Sep 2017
<b>Poster</b> “A rare and prolific r-process event in Reticulum II”, Nuclei in the Cosmos XIV	Jun 2016
<b>Poster</b> “Satellite Planes in Caterpillar”, Local Group Astrostatistics Conf, U Michigan	Jun 2015
<b>Poster</b> “Testing early star formation”, Near-Field Far-Field Conf, UC Irvine	Feb 2014

## TEACHING

---

<b>Professional Development Program*</b>	ISEE (with R. McGurk, D. French)	2018
<b>Workshop</b>	Carnegie, Scientific Writing Workshop for Undergraduates (with J. Teske)	2017
<b>Teaching Assistant</b>	MIT, 8.282/8.284: Intro to Astronomy/Modern Astrophysics	2014/2016/2017
<b>Head Teaching Assistant</b>	Stanford, Physics 25/26: Modern Physics	2012
<b>Teaching Assistant</b>	Stanford, Physics 63: Electricity, Magnetism, and Waves	2012
<b>Teaching Assistant*</b>	Stanford, Physics 62: Classical Mechanics Laboratory	2010/2011
<b>Instructor*</b>	Stanford, Physics 91SI: Practical Computing for Scientists	2011
<b>Teaching Assistant</b>	Stanford, Physics 24: Electricity and Optics Laboratory	2011
<b>Resident Tutor</b>	Stanford CTL, Math, science, and engineering tutoring	2009 - 2010
<b>Section Leader</b>	Stanford, CS 106A/B: Programming Methods/Abstractions	2008 - 2009

\* Led or assisted in curriculum development

## OUTREACH AND SERVICE

---

<b>Referee</b>	for ApJ, MNRAS, A&A	
<b>Mentor</b>	for high school and undergraduate students	
<b>Public Talk</b>	“Glimpses of the Cosmic Dawn”, Carnegie Lunch with an Astronomer	Nov 2017
<b>Public Talk</b>	“Searching for the First Stars”, Carnegie Open House	Oct 2017
<b>Public Talk</b>	“Glimpses of the Cosmic Dawn”, Whitin Observatory at Wellesley	Apr 2017
<b>Public Talk</b>	“The First Stars”, MIT IAP	Jan 2017
<b>Einstein in the Classroom Instructor</b>	Cambridge Science Festival	Apr 2015
<b>Science by the Pint</b>	public outreach with Harvard Science in the News	Apr 2015
<b>Public Talk</b>	“The First Stars”, MIT IAP	Jan 2015
<b>Public Talk</b>	“The Universe in a Box”, MIT IAP	Jan 2014
<b>Science Outreach</b>	Taught courses at SPLASH, Exploring New Worlds, etc.	Sep 2007 - Jun 2011

## TELESCOPE AND COMPUTING ALLOCATIONS

---

<b>Magellan/MIKE</b>	High-resolution spectroscopy, >20 nights (PI and Co-I)
<b>Magellan/M2FS</b>	Multi-object spectroscopy, 3 nights (PI)
<b>VLT/FLAMES</b>	Multi-object spectroscopy, 1.6 nights (PI)
<b>Gemini/GRACES</b>	High-resolution spectroscopy, 3.4 nights (PI)
<b>Keck/HIRES</b>	High-resolution spectroscopy, 1 night (Co-I)
<b>Hubble/ACS</b>	12 orbits (Co-I)
<b>XSEDE/Stampede, Comet</b>	10 million CPU hours (Co-I)

## STUDENT COLLABORATORS

---

<b>Graduate Students</b>	Kaley Brauer (MIT, 2017-present, stellar halo models)
<b>Undergraduates</b>	Sergio Escobar (Caltech, 2018, stellar halo kinematics); Maude Gull (MIT, 2016-2018, r-process star abundances); Madelyn Cain (MIT, 2016-2018, r-process star abundances); Lizhou Sha (MIT, 2016-2017, dark matter simulations)

## PRIMARY AUTHOR PUBLICATIONS

---

First-author papers, or papers where I performed a major part of analysis, writing, or advising.

11. **Ji, A. P.** & Frebel, A. *From Actinides to Zinc: Using the full abundance pattern of the brightest star in Reticulum II to distinguish between different r-process sites*, 2018, ApJ, 856, 138
10. Safarzadeh, M., **Ji, A. P.**, Dooley, G., Frebel, A., Scannapieco, E., Gomez, F., O’Shea, B. W. *Selecting ultra-faint dwarf candidate progenitors in cosmological N-body simulations at high redshifts*, 2018, MNRAS, 476, 5006
9. Griffen, B. F., Dooley, G., **Ji, A. P.**, O’Shea, B. W., Gomez, F., Frebel, A., *Tracing the origin of the first stars and galaxies within the hierarchical assembly history of the Milky Way*, 2018, MNRAS, 474, 443
8. **Ji, A. P.**, Frebel, A., Ezzeddine, R., Casey, A. R. *Chemical Diversity in the Ultra-faint Dwarf Galaxy Tucana II*, 2016, ApJL, 832, 1
7. **Ji, A. P.**, Frebel, A., Simon, J. D., Chiti, A. *Complete element abundances of nine stars in the r-process galaxy Reticulum II*, 2016, ApJ, 830, 93
6. **Ji, A. P.**, Frebel, A., Chiti, A., Simon, J. D. *R-process enrichment from a single event in an ancient dwarf galaxy*, 2016, Nature, 531, 610
5. Griffen, B. F., **Ji, A. P.**, Dooley, G. A., Gomez, F. A., Vogelsberger, M., O’Shea, B. W., Frebel, A., *The Caterpillar Project: A Large Suite of Milky Way Sized Halos*, 2016, ApJ, 818, 10
4. **Ji, A. P.**, Frebel, A., Simon, J. D., Geha, M., *High-resolution spectroscopy of extremely metal-poor stars in the least evolved galaxies: Bootes II*, 2016, ApJ, 817, 41
3. Frebel, A., Chiti, A., **Ji, A. P.**, Jacobson, H. R., Placco, V. M., *SD 1313–0019 — another second generation star with  $[Fe/H] = -5.0$ , observed with the Magellan telescope*, 2015, ApJL, 810, 27
2. **Ji, A. P.**, Frebel, A., Bromm, V., *Preserving chemical signatures of primordial star formation in the first low-mass stars*, 2015, MNRAS, 454, 659
1. **Ji, A. P.**, Frebel, A., Bromm, V., *The chemical imprint of silicate dust on the most metal-poor stars*, 2014, ApJ, 782, 95

## N-TH AUTHOR PUBLICATIONS

---

Papers where I provided telescope resources, data, code, advising, minor analysis, paper comments, and/or other minor contributions.

10. Kemp, A., Casey, A., ..., **Ji, A. P.**, ..., *On the discovery of K-enhanced and possibly Mg-depleted stars throughout the Milky Way*, MNRAS accepted 2018
9. Cain, M. G., Frebel, A., Gull, M., **Ji, A. P.**, ..., *The R-Process Alliance: Chemical Abundances for a Trio of R-Process-Enhanced Stars*, ApJ accepted 2018
8. Gull, M., Frebel, A., Cain, M. G., Placco, V., **Ji, A. P.**, ..., *The R-Process Alliance: discovery of the first metal-poor star with a combined r- and s-process element signature*, ApJ accepted 2018
7. Chiti, A., Frebel, A., **Ji, A. P.**, Jerjen, H., Kim, D., Norris, J. E., *Chemical Abundances of New Member Stars in the Tucana II Dwarf Galaxy*, 2018, ApJ, 857, 74
6. Li, T. S., Simon, J. D., ..., **Ji, A. P.**, ..., *Ships Passing in the Night: Spectroscopic Analysis of Two Ultra-Faint Satellites in the Constellation Carina*, 2018, ApJ, 851, 145
5. Hartwig, T., Yoshida, N., ..., **Ji, A. P.**, ..., *Descendants of the first stars: the distinct chemical signature of second generation stars*, 2018, MNRAS 478, 1795

4. Drout, M. R., Piro, A. L., . . . , **Ji, A. P.**, . . . , *Light Curves of the Neutron Star Merger GW170817/SSS17a: Implications for R-Process Nucleosynthesis*, 2017, Science, 358, 1570
3. Shappee, B. J., Simon, J. D., . . . , **Ji, A. P.**, . . . , *Early Spectra of the Gravitational Wave Source GW170817: Evolution of a Neutron Star Merger*, 2017, Science, 358, 1574
2. Placco, V. M., Holmbeck, E. M., . . . , **Ji, A. P.**, . . . , *RAVE J203843.2–002333: The first highly r-process enhanced star identified in the RAVE survey*, 2017, ApJ, 844, 18
1. Dooley, G., Griffen, B. F., Zuck, P., **Ji, A. P.**, Vogelsberger, M., Hernquist, L., Frebel, A., *The effects of varying cosmological parameters on halo substructure*, 2014, ApJ, 786, 50