Alexander P. Ji

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EDUCATION AND APPOINTMENTS

Hubble Fellow, Observatories of the Carnegie Institution of Washington — Aug 2017 - Present

Ph. D. Physics, Massachusetts Institute of Technology — Sep 2012 - Jun 2017
Advised by Anna Frebel, Astrophysics division

M.S. Statistics, Stanford University — Jun 2012
Focus on Applied Statistics and Machine Learning

B. S. Physics, Stanford University — Jun 2011
Minor in Computer Science

HONORS AND AWARDS

Hubble Fellowship	2017-2020
Carnegie Fellowship	Deferred
APS DAP Cecilia Payne-Gaposchkin Thesis Award Finalist	Apr 2019
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

SELECTED TALKS AND POSTERS

Invited Talk "Signatures of the First Stars in Relics of the First Galaxies", APS Denver — Apr 2019
Invited Talk "r-process nucleosynthesis in the first galaxies", Stellar Archaeology, Tokyo — Dec 2018
Invited Talk "Connecting dwarf galaxies to the stellar halo", Metal-Poor Galaxy, Ringberg — Jul 2018
Invited Talk "r-process nucleosynthesis in dwarf galaxies", AAS Denver — Jun 2018
Colloquium U. Virginia (Joint Physics/Astronomy) — Feb 2018
Invited Seminar "A rare and prolific r-process event in Reticulum II", CCAPP/OSU — Oct 2016
Highlight Talk "Dwarf galaxy archaeology with Reticulum II", First Stars V, Heidelberg — Aug 2016
Invited Talk "A single prolific r-process event preserved in an ultra-faint dwarf galaxy", American Physical Society Hot Topics Session, April Meeting — Apr 2016
Colloquium "A rare and prolific r-process event in Reticulum II", University of Toledo — Jan 2016

Talk "Lanthanide fractions in neutron star mergers from metal-poor stars", ASU — Mar 2019
Talk "Dwarf galaxy archaeology with Reticulum II", UC Irvine — May 2018
Talk "A full abundance pattern in Reticulum II", JINA Frontiers — May 2018
Talk "Homogeneous Abundances in Ultra-faint Dwarf Galaxies", JINA Forging Connections — Jun 2017
Talk "Dwarf galaxy archaeology with Reticulum II", The Galactic Renaissance — Feb 2017
Seminars "Dwarf galaxy archaeology with Reticulum II", 7 talks — Apr-Nov 2016
At Caltech, CfA, UCSC, Yale, Carnegie, KIPAC, Tufts
Poster "Stellar Abundances in Ultra-faint Dwarf Galaxies", GMT Science Meeting — Sep 2017
Poster "A rare and prolific r-process event in Reticulum II", Nuclei in the Cosmos XIV — Jun 2016
Poster "Satellite Planes in Caterpillar", Local Group Astrostatistics Conf, U Michigan — Jun 2015
Poster "Testing early star formation", Near-Field Far-Field Conf, UC Irvine — Feb 2014

TEACHING

Professional Development Program*	ISEE (as team leader, with A. Lanz, S. Uddin)	2019
Professional Development Program*	ISEE (with R. McGurk, D. French)	2018
Workshop	Carnegie, Scientific Writing Workshop for Undergraduates (with J. Teske)	2017
Teaching Assistant	MIT, 8.282/8.284: Intro to Astronomy/Modern Astrophysics	2014/2016/2017
Head Teaching Assistant	Stanford, Physics 25/26: Modern Physics	2012
Teaching Assistant	Stanford, Physics 63: Electricity, Magnetism, and Waves	2012
Teaching Assistant*	Stanford, Physics 62: Classical Mechanics Laboratory	2010/2011
Instructor*	Stanford, Physics 91SI: Practical Computing for Scientists	2011
Teaching Assistant	Stanford, Physics 24: Electricity and Optics Laboratory	2011
Resident Tutor	Stanford CTL, Math, science, and engineering tutoring	2009 - 2010
Section Leader	Stanford, CS 106A/B: Programming Methods/Abstractions	2008 - 2009

* Led or assisted in curriculum development

SELECTED OUTREACH AND SERVICE

Referee	for ApJ, MNRAS, A&A	
Public Talk	"Glimpses of the Cosmic Dawn", Huntington Library Astronomy Lectures	Mar 2019
Public Talk	"Glimpses of the Cosmic Dawn", Carnegie Lunch with an Astronomer	Nov 2017
Public Talk	"Searching for the First Stars", Carnegie Open House	Oct 2017
Public Talk	"Glimpses of the Cosmic Dawn", Whitin Observatory at Wellesley	Apr 2017
Public Talk	"The First Stars", MIT IAP	Jan 2017
Einstein in the Classroom Instructor	Cambridge Science Festival	Apr 2015
Public Talk	"The First Stars", MIT IAP	Jan 2015
Public Talk	"The Universe in a Box", MIT IAP	Jan 2014

TELESCOPE AND COMPUTING ALLOCATIONS

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

STUDENT COLLABORATORS

Graduate Students Kaley Brauer (MIT, 2017-present, stellar halo models)

Undergraduates 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; now TESS Quick-Look Pipeline Engineer)

PRIMARY AUTHOR PUBLICATIONS

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

15. **Ji, A. P.**, Drout, M. R., & Hansen, T. T., *The Lanthanide Fraction Distribution in Metal-poor Stars: a Test of Neutron Star Mergers as the Dominant r-process Site*, submitted (arXiv:1905.01814)

14. Frebel, A., **Ji, A. P.**, Ezzeddine, R., Hansen, T. T., Chiti, A., Thompson, I. B., Merle, T. *Chemical abundance Signature of J0023+0307 – A Second-Generation Main-Sequence Star with [Fe/H] < −6*, 2019, ApJ, 871, 146

13. Brauer, K., **Ji, A. P.**, Frebel, A., Dooley, G. A., Gomez, F. A., O'Shea, B. W. *The Origin of r-process Enhanced Metal-Poor Halo Stars In Now-Destroyed Ultra-Faint Dwarf Galaxies*, 2019, ApJ, 871, 2

12. **Ji, A. P.**, Simon, J. D., Frebel, A., Venn, K. A., Hansen, T. T. *Chemical Abundances in the Ultra-Faint Dwarf Galaxies Grus I and Triangulum II: Neutron-Capture Elements as a Defining Feature of the Faintest Dwarfs*, 2019, ApJ, 870, 83

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

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

12. Placco, V., Santucci, R. M., . . . , **Ji, A. P.**, . . . , *The R-Process Alliance: Spectroscopic Follow-up of Low-metallicity Star Candidates from the Best & Brightest Survey*, 2019, ApJ, 870, 122

11. Kozlowski, S., Bañados, E., . . . , **Ji, A. P.**, . . . , *Discovery of two quasars at $z = 5$ from the OGLE survey*,

10. Kemp, A., Casey, A., . . . , **Ji, A. P.**, . . . , *On the discovery of K-enhanced and possibly Mg-depleted stars throughout the Milky Way*, 2018, MNRAS, 480, 1384

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*, 2018, ApJ, 864, 43

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*, 2018, ApJ, 862, 174

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., Zukin, P., **Ji, A. P.**, Vogelsberger, M., Hernquist, L., Frebel, A., *The effects of varying cosmological parameters on halo substructure*, 2014, ApJ, 786, 50

UNREFEREED MANUSCRIPTS

4. **Ji, A. P.** et al., *Local Dwarf Galaxy Archaeology*, White Paper submitted to the Astro 2020 Decadal Survey

3. Simon, J. D. et al., *Dynamical Masses for a Complete Census of Local Dwarf Galaxies*, White Paper submitted to the Astro 2020 Decadal Survey

2. Roederer, I. U. et al., *The First Stars and the Origin of the Elements*, White Paper submitted to the Astro 2020 Decadal Survey

1. Roederer, I. U. et al., *The astrophysical r-process and the origin of the heaviest elements*, White Paper submitted to the Astro 2020 Decadal Survey