

Anirudh Chiti

achiti@uchicago.edu

Education & Appointments

Kavli Institute for Cosmological Physics, University of Chicago Brinson Prize Fellow in Observational Astrophysics	Sep 2021 – Present
Massachusetts Institute of Technology Ph.D. in Physics Thesis: <i>Mapping the Ancient Milky Way and its Relic Dwarf Galaxies</i> Advised by Anna Frebel	May 2021
Cornell University B.A. in Physics <i>Magna Cum Laude</i> and B.A. in Mathematics <i>with Distinction</i> Minor in Astronomy	May 2014

Awards & Honors

IAU Division H PhD Prize , Thesis award from the International Astronomical Union	2022
Henry Kendall Teaching Award , Graduate teaching award in the MIT Physics Department	2016
Honorable Mention, NSF Graduate Research Fellowship Program	2016
Whiteman Fellow , First-year fellowship at MIT	2014 – 2015
Cranston and Edna Shelley Award , Undergraduate research award in Astronomy at Cornell	2014
Dean's List, Cornell University , GPA-based award	Fall 2010 – Fall 2013

Competitively Obtained Telescope Time

PI, 55.5 nights on CTIO/DECam – Imaging (2023A, 2023B-2026A– PI: the DECam MAGIC Survey)	
PI, 13.5 nights on Magellan/IMACS – Imaging (2020A, 2020B, 2021A, 2021B, 2022A, 2023B)	
PI, 8 nights on Magellan/IMACS – Multi-slit spectroscopy (2015B, 2016A, 2016B, 2018A)	
PI, 12 nights on Magellan/MagE – Single-slit spectroscopy, (2016B, 2018A, 2018B, 2019A, 2019B)	
PI, 1 night on Magellan/M2FS – Multi-fiber spectroscopy, (2016A)	
PI, 8.5 nights on Magellan/MIKE – Single-slit spectroscopy, (2020B, 2021A, 2021B, 2022B, 2023A)	
Co-I, 2 nights on Magellan/M2FS – Multi-fiber spectroscopy, (2015A)	
Co-I, 6 nights on Magellan/MIKE – Single-slit spectroscopy, (2016B, 2019A, 2022A)	
Co-I, 30 hours on SkyMapper – Imaging, (2017B, 2018A)	

Professional Service

NOIRLab Time Allocation Committee member	May 2023
External Panelist/Subject matter reviewer in two NASA peer reviews	Spring, Summer 2023
Referee for ApJ, A&A, MNRAS, PASJ	2019 – Present
Co-organizer, KICP Seminar Series	Sep 2022 – May 2023
Co-organizer, KICP Postdoc Symposium	May 2023
Co-organizer, UChicago/KICP Gaia DR3 Sprint	Jun 2022
Co-organizer, KICP Postdoc Jamboree	Apr 2022
Co-organizer, UChicago/KICP Friday astro-ph discussions	Sep 2021 – Jun 2022
External Reviewer for Gemini Telescope Proposal	Nov 2021
Organizing Committee, JINA-CEE Frontiers in Nuclear Astrophysics Meeting	May 2018

Leadership, Mentoring, and Outreach Experience

Research Projects with undergraduate/graduate students:

Charlie Walsh (Deriving surface gravities from narrow-band photometry)	Summer 2023
Yue Pan (Stellar metallicities from DECam u -band photometry)	Oct 2022 – Present
Xiaowei Ou (Signatures of tidal disruption in the Hercules dwarf galaxy)	Sep 2022 – Present
Kiyan Tavangar (Tidal tails and halos around globular clusters)	Oct 2021 – Present
Kylie Hansen (Chemical abundances of stars in classical dwarf galaxies)	May 2019 – May 2020
Tatsuya Daniel (Developing a low-metallicity map of the Milky Way)	Aug 2019 – May 2020

Co-organizer, Lifelong learning talk series

Sep 2022 – May 2023

Organized twice monthly talks at local libraries and retirement centers

Public Talk: “Searching for the First Stars”, Art of Science series

December 2022

Public Talk: “Searching for the First Stars”, Lifelong learning series

March, December 2022

Co-director & Founding member, MIT Sidewalk Astronomy Club

Fall 2017 – Aug 2020

Organized 10+ sidewalk stargazing sessions, serving over 400 members of the public

Guest presenter, STEAM Ahead Learning Academy

Summer 2019

Helped organize a hands-on spectroscopy demonstration and a solar observing session for rising 5th graders in the STEAM Ahead summer camp, affiliated with Boston Public Schools.

Volunteer, Cambridge Science Festival

Spring 2019

Helped organize a hands-on telescope exhibit and solar observing booth as part of the “Science Carnival & Robot Zoo” event of the Cambridge Science Festival.

Volunteer, Latino STEM Alliance Science Festival

Spring 2019

Online Project Course Instructor, MIT MOSTEC

Summers 2015 – 2018

Instructed an online astrophysics course for rising high school seniors, largely from under-represented or under-resourced communities. Responsibilities included running the course (e.g., curriculum development, administration, developing interactive online teaching sessions), and mentoring students to build toward a final presentation of their independent research projects at MIT. I have taught and mentored over 60 high school students over my four summers in this program.

Conference Workshop Co-Instructor, MIT MOSTEC

August 2015, 2017, 2018

Helped design and lead astrophysics workshops in which rising high school seniors analyzed images of a star to derive properties (e.g., orbit, size) of its transiting exoplanet. I held six of these sessions over three summers for groups of 10 to 30 students.

Public Talk: “Searching for the First Stars”, MIT IAP

January 2018

Selected Media Coverage

An Extended Halo around an Ancient Dwarf Galaxy (Chiti et al. 2021), featured on CNN, the Guardian, Sky & Telescope, MIT News, German National Radio, Gizmodo, and 35 other outlets.

Discovery of 18 stars with $-3.10 < [\text{Fe}/\text{H}] < -1.45$ in the Sagittarius dwarf galaxy (Chiti, Hansen & Frebel 2020), featured on phys.org.

Teaching Experience

Guest lecturer, UChicago, ASTR298: Undergraduate Research Seminar

Spring 2022, 2023

Guest lecturer, UChicago, ASTR133: Introduction to Astrophysics

Spring 2022

Graduate Teaching Assistant, MIT, 8.02: Physics II – Electricity & Magnetism

Spring 2020

Graduate Teaching Assistant, MIT, 8.287: Techniques of Optical Astronomy Student rating: 7.0/7.0	Fall 2018
Graduate Teaching Assistant, MIT, 8.287: Techniques of Optical Astronomy Student rating: 6.7/7.0	Fall 2017
Graduate Teaching Assistant, MIT, 8.01: Physics I – Mechanics Student rating: 6.6/7.0	Fall 2016
Graduate Teaching Assistant, MIT, 8.01: Physics I – Mechanics Student rating: 6.4/7.0	Fall 2015
Grader, MIT, 8.902: Astrophysics II	Fall 2015
Undergraduate TA, Cornell University, Fundamentals of Physics II	Spring 2012

Seminars & Colloquiua (* = invited)

25. *Upcoming.* Columbia Thursday Astronomy Seminar, USA, Nov 2023.
24. **Upcoming.* STScI Galaxy Journal Club Talk, USA, Nov 2023.
23. *Upcoming.* University of Notre Dame Astronomy Seminar, USA, Nov 2023.
22. **Upcoming.* KIPAC Tea Talk, USA, Oct 2023.
21. **Upcoming.* Texas A&M Astronomy Seminar, USA, Oct 2023.
20. **Uncovering the Ancient Milky Way.* Yale Astronomy Colloquium, USA, Oct 2023.
19. *Uncovering extended halos around ancient dwarf galaxies.* Northwestern/CIERA Observational Group Meeting, USA, May 2023.
18. *Characteristics of the SkyMapper u-band filter and implications for calibration.* LSST Photometric Calibrations Working Group Meeting, USA, Apr 2023.
17. *Uncovering low metallicity stars in the Large Magellanic Cloud.* UChicago Survey Science Seminar, USA, Apr 2023.
16. *Uncovering the most metal-poor stars in the Milky Way's dwarf galaxies– Insights on small-scale galaxy evolution.* NAOJ Subaru/HDS Seminar Series, Japan, Feb 2023.
15. *Mapping the ancient Milky Way.* UChicago Society of Physics Students Seminar Series, Jan 2023.
14. **The most metal-poor stars in the Milky Way's Ultra-faint Dwarf Galaxies.* NASA Cosmic Origins, Stars Science Interest Group Seminar, Oct 2022.
13. *Mapping the ancient stellar populations of the Milky Way and its relic dwarf galaxies.* University of Chicago Astronomy Tuesday Seminar, Sep 2021.
12. **An extended halo around an ancient dwarf galaxy.* IAS astro-coffee, Dec 2020.
11. *A halo of chemically primitive stars around an ancient dwarf galaxy.* University of Chicago Astronomy Tuesday Seminar, Nov 2020.
10. *An extended halo around an ancient dwarf galaxy.* UCSC Friday Lunchtime Astrophysics Seminar, Oct 2020.
9. *An extended halo around an ancient dwarf galaxy.* Yale Galaxy Lunch Talk, Oct 2020.
8. **Discovering the most metal-poor stars in the Milky Way's dwarf galaxies.* SFSU Physics & Astronomy Colloquium, Oct 2020.

7. **A halo of chemically primitive stars around an ancient dwarf galaxy.* University of Michigan Galaxy Group Talk, Oct 2020.
6. *An extended halo around an ancient dwarf galaxy.* Steward/NOAO Galaxy Group Lunch Talk, Sep 2020.
5. *A halo of chemically primitive stars around an ancient dwarf galaxy.* IReNA Online Seminar, Jun 2020.
4. *What did the first galaxies look like?* MIT Physics Department Talk Series, Apr 2020.
3. *Finding the most metal-poor stars in the Milky Way's dwarf galaxies.* STScI Galaxy Journal Club Talk, Nov 2019.
2. *Finding the most metal-poor stars in the Milky Way's dwarf galaxies.* Caltech Astronomy Tea Talk, Oct 2019.
1. *Finding the most metal-poor stars in the Milky Way's dwarf galaxies.* Carnegie Lunch Talk, Oct 2019.

Conference Talks & Posters (* = invited)

**No conferences April 2020 to Winter 2021 due to covid-19*

22. **Talk.** *Signatures of Extragalactic First Stars in the Large Magellanic Cloud.* Galactic Frontiers: Dwarf Galaxies in the Local Volume and Beyond, USA, Jul 2023.
21. **Talk.** *The most metal-poor stars in the Large Magellanic Cloud.* University of Chicago NLTE Workshop, USA, Jun 2023.
20. **Poster.** *Signatures of the First Stars in the Large Magellanic Cloud.* JINA-CEE Frontiers in Nuclear Astrophysics Meeting, USA, May 2023.
19. **Talk.** *High-resolution spectroscopy of stars in the outskirts of the Tucana II dwarf galaxy.* IAUS 379, Germany, Mar 2023.
18. **Talk.** *Detailed chemical abundances of stars in the outskirts of an ancient dwarf galaxy.* IAUS 377, Malaysia, Feb 2023.
17. **Talk.** *Detailed chemical abundances of stars in the outskirts of an ancient dwarf galaxy.* AAS 241st meeting, USA, Jan 2023.
16. **Talk.** *Exploring the outskirts of the Milky Way's ultra-faint dwarf galaxies.* DELVE Collaboration Meeting, USA, Oct 2022.
15. ***Talk.** *Mapping the ancient Milky Way and its relic dwarf galaxies.* International Astronomical Union General Assembly, South Korea, Aug 2022.
14. **Talk.** *A halo of chemically primitive stars around an ancient dwarf galaxy.* JINA-CEE Frontiers in Nuclear Astrophysics Meeting, USA, May 2022.
13. **Talk.** *Detection of a spatially extended population of extremely metal-poor stars in the Tucana II ultrafaint dwarf galaxy.* First Stars VI, Chile, March 2020.
12. **Talk.** *Chemical characterization of dwarf galaxies using SkyMapper photometry.* Stellar Archaeology as a Time Machine to the First Stars Meeting, Japan, Dec 2018.
11. ***Talk.** *Overview talk – Measuring stellar chemical abundances to trace the origin of elements.* JINA-CEE Frontiers in Nuclear Astrophysics Junior Workshop, USA, May 2018.

10. **Talk.** *Detection of a Population of Carbon-enhanced metal-poor stars in the Sculptor dwarf galaxy.* IAU Symposium 334: Rediscovering the Milky Way, Germany, Jul 2017.
9. **Poster.** *Chemical characterization of the Tucana II and Tucana III dwarf galaxies using SkyMapper photometry.* JINA-CEE Frontiers in Nuclear Astrophysics Meeting, USA, May 2018.
8. **Poster.** *Chemical characterization of dwarf galaxies using SkyMapper photometry.* Small Galaxies, Cosmic Questions Conference, UK, Aug 2019.
7. **Poster.** *Photometric searches for metal-poor stars in the Sculptor and Tucana II dwarf galaxies.* JINA Forging Connections Meeting, USA, Jun 2017.
6. **Poster.** *Chemical Abundances of Stars in the Sculptor Dwarf Spheroidal Galaxy.* First Stars V Meeting, Germany, Aug 2016.
5. **Poster.** *Chemical Abundances of Stars in the Sculptor Dwarf Spheroidal Galaxy.* Joint Institute for Nuclear Astrophysics Frontiers Meeting, USA, Apr 2016.
4. **Poster.** *Chemical Abundances of Stars in the Sculptor Dwarf Spheroidal Galaxy.* 3rd Annual GMT Community Science Meeting, USA, Oct 2015.
3. **Poster.** *Transient Events in Archival VLA Observations of the Galactic Center.* 223rd American Astronomical Society Meeting, USA, Jan 2014.
2. **Poster.** *Volcanic Effects in the Upper Atmosphere.* American Geophysical Union Fall Meeting, USA, Dec 2013.
1. **Poster.** *Infrared Properties of Single-Walled Carbon Nanotubes.* Mid-InfraRed Technologies for Health and the Environment Summer Workshop, USA, Aug 2010.

10+ additional internal journal club & graduate student lunch talks at MIT

Publication Record

Summary: 31 total publications; 12 first author papers; 4 second or third author papers; 15 nth author papers. > 1200 total citations (ref: google scholar).

First-author publications:

12. **Chiti, A.**, Mardini, M. K., Limberg, G., Frebel, A., Ji, A. P., Reggiani, H., Ferguson, P., Andales, H. D., Brauer, K. V., Li, T. S., Simon, J. D., *Signatures of Extragalactic First Stars in the Large Magellanic Cloud.* In review at Nature.
11. **Chiti, A.**, Frebel, A., Ji, A. P., Mardini, M. K., Ou, X., Simon, J. D., Jerjen, H., Kim, D., Norris, J. E., *Detailed Chemical Abundances of Stars in the Outskirts of the Tucana II ultra-faint dwarf galaxy.* 2023, **AJ**, 165, 55.
10. **Chiti, A.**, Simon, J. D., Frebel, A., Pace, A. B., Ji, A. P., Li, T. S., *Magellan/IMACS Spectroscopy of Grus I: A low metallicity ultra-faint dwarf galaxy.* 2022, **ApJ**, 939, 41.
9. **Chiti, A.**, Mardini, M. K., Frebel, A., Daniel, T., *The Metal-Poor Metallicity Distribution of the Ancient Milky Way.* 2021, **ApJL**, 911, L23.
8. **Chiti, A.**, Frebel, A., Mardini, M. K., Daniel, T., Ou, X., Uvarova, A. V. *Stellar metallicities from SkyMapper photometry II: Precise Photometric metallicities of $\sim 280,000$ giant stars with $[Fe/H] < -0.75$ in the Milky Way from SkyMapper DR2.* 2021, **ApJS**, 254, 31.

7. **Chiti, A.**, Frebel, A., Simon, J. D., Erkal, D., Chang, L. J., Necib, L., Ji, A. P., Jerjen, H., Kim, D., Norris, J., *An extended halo around an ancient dwarf galaxy*. 2021, **Nat Astron**, <https://doi.org/10.1038/s41550-020-01285-w>.
6. **Chiti, A.**, Hansen, K. Y., Frebel, A., *Discovery of 18 stars with $-3.10 < [Fe/H] < -1.45$ in the Sagittarius dwarf galaxy*. 2020, **ApJ**, 901, 164.
5. **Chiti, A.**, Frebel, A. L., Jerjen, H., Kim, D., Norris, J., *Stellar metallicities from SkyMapper photometry I: A study of the Tucana II ultra-faint dwarf galaxy*. 2020, **ApJ**, 891, 8.
4. **Chiti, A.** & Frebel, A. L., *Four Metal-poor Stars in the Sagittarius Dwarf Spheroidal Galaxy*. 2019, **ApJ**, 875, 112.
3. **Chiti, A.**, Frebel, A. L., Ji, A. P., Jerjen, H., Kim, D., Norris, J., *Chemical Abundances of new member stars in the Tucana II dwarf galaxy*. 2018, **ApJ**, 857, 74.
2. **Chiti, A.**, Simon, J. D., Frebel, A. L., Mateo, M., Bailey, J. I., Crane, J., Shectman, S., Thompson, I., Walker, M., *Detection of a Population of Carbon-enhanced Metal-poor stars in the Sculptor dwarf galaxy*. 2018, **ApJ**, 856, 142.
1. **Chiti, A.**, Chatterjee, S., Wharton, R. S., Cordes, J., Lazio, T. J. W., Kaplan, D. L., Bower G. C., Croft, S., *Transient Events in Archival Very Large Array Observations of the Galactic Center*, 2016, **ApJ**, 833, 11.

Second or third-author publications:

4. Mardini, M. K., Frebel, A., **Chiti, A.**, *An Sr rich ultra metal-poor star from the GaiaXP catalog*. Submitted to MNRAS.
3. Mardini, M. K., Frebel, A., **Chiti, A.**, Meiron, Y., Brauer, K. V., Ou, X., *The Atari Disk, a Metal-poor Stellar Population in the Disk System of the Milky Way*. 2022, **ApJ**, 936, 78.
2. Ji, A. P., Frebel, A. L., **Chiti, A.**, Simon, J. D., *R-process enrichment from a single event in an ancient dwarf galaxy*, 2016, **Nature**, 10.1038, 1476-4687.
1. Frebel, A. L., **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, L27.

Nth-author publications:

15. Limberg, G., Ji, A. P., Naidu, R. P., **Chiti, A.**, Rossi, S., Usman, S. A., Ting, Y-S., Zaritsky, D., Bonaca, A., Borbolato, L., Speagle, J. S., Chandra, V., Conroy, C. *Extending the Chemical Reach of the H3 Survey: Detailed Abundances of the Dwarf-galaxy Stellar Stream Wukong/LMS-1*. Submitted to MNRAS.
14. Heiger, M. E., Li, T. S., Pace, A. B., Simon J. D., Ji, A. P., **Chiti, A.**, Bom, C. R., Carballo-Bello, J. A., Carlin, J. L., Cerny, W., Choi, y., Drlica-Wagner, A., James, D. J., Martinez-Vazquez, C. E., Medina, G. E., Mutlu-Pakdil, B., Navabi, M., Noel, N. E. D., Sakowska, J. D., Stringfellow, G. S. *Reading Between the (Spectral) Lines: Magellan/IMACS spectroscopy of the Ultra-faint Dwarf Galaxies Eridanus IV and Centaurus I*. arXiv:2308.0860.
13. Cerny, W. et al. (inc. **Chiti, A.**), *Six More Ultra-faint Milky Way Companions Discovered in the DECam Local Volume Exploration Survey*. 2023, **ApJ**, 953, 1.
12. Oey, M. S., Castro, N., Renzo, M., Vargas-Salazar, I., Suffak, M. W., Ratajczak, M., Monnier, J. D., Szymanski, M. K., Phillips, G. D., Calvet, N., **Chiti, A.**, Micheva, G., Rasmussen, K. C., Townsend, R. H. D., *Strong Variability in AzV 493, an Extreme Oe-type Star in the SMC*. 2023, **ApJ**, 947, 27.

11. Mardini, M. K., Frebel, A., Ezzeddine, R., **Chiti, A.**, Meiron, Y., Ji, A. P., Placco, V. M., Roederer, I. U., Melendez, J., *The chemical abundance pattern of the extremely metal-poor thin disc star 2MASS J1808-5104 and its origins*. 2022, **MNRAS**, 10.1093/mnras/stac2783.
10. Sand, D. J., Mutlu-Pakdil, B., Jones, M. G., Karunakaran, A., Wang, F., Yang, J., **Chiti, A.**, Bennet, P., Crnojevic, D., Spekkens, K., *Tucana B: An Isolated and Quenched Ultra-faint Dwarf Galaxy at $D=1.4$ Mpc*. 2022, **ApJ**, 935, 17.
9. Yong, D., Da Costa, G. S., Bessell, M. S., **Chiti, A.**, Frebel, A., Gao, X., Lind, K., Mackey, A. D., Marino, A. F., Murphy, S. J., Nordlander, T., Asplund, M., Casey, A. R., Kobayashi, C., Norris, J. E., Schmidt, B. P., *High resolution spectroscopic follow-up of the most metal-poor candidates from SkyMapper DR1.1*. 2021, **MNRAS**, <https://doi.org/10.1093/mnras/stab2001>.
8. Yong, D., Kobayashi, C., Da Costa, G. S., Bessell, M. S., **Chiti, A.**, Frebel, A., Lind, K., Mackey, A. D., Nordlander, T., Asplund, M., Casey, A. R., Marino, A. F., Murphy, S. J., Schmidt, B. P., *r-Process elements from magnetorotational hypernovae*. 2021, **Nature**, <https://doi.org/10.1038/s41586-021-03611-2>.
7. Wevers, T., Pasham, D. R., van Velzen, S., Miller-Jones, J. C. A., Uttley, P., Gendreau, K. C., Remil-land, R., Arzoumanian, Z., Löwenstein, M., **Chiti, A.**, *Rapid state transitions in a supermassive black hole's accretion flow*. 2021, **ApJ**, 912, 151.
6. Ezzeddine, R., Rasmussen, K., Frebel, A., **Chiti, A.**, Hinojosa, K., Placco, V. M., Beers, T. C., Hansen, T. T., Roederer, I. U., Sakari, C. M., Ji, A. P., Melendez, J., *The R-process Alliance: First Magellan/MIKE Release from the Southern Search for R-Process-enhanced Stars*. 2020, **ApJ**, 898, 150.
5. Nordlander, T., Bessell, M. S., Da Costa, G. S., Mackey, A. D., Asplund, M., Casey, A. R., **Chiti, A.**, Ezzeddine, R., Frebel, A., Lind, K., Marino, A. F., Murphy, S. J., Norris, J. E., Schmidt, B. P., Yong, D., *The lowest detected stellar Fe abundance: The halo star SMSS J160540.18-144323.1*. 2019, **MNRAS**, 488, 1.
4. Frebel, A. L., 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.
3. Placco, V. M., Frebel, A. L., Beers, T. C., Yoon, J., **Chiti, A.**, Heger, A., Chan, C., Casey, A. R., Christlieb, N., *Observational Constraints on First-Star Nucleosynthesis. II. Spectroscopy of an Ultra metal-poor CEMP-no Star*, 2016, **ApJ**, 833, 21.
2. Kim, D., Jerjen, H., Geha, M., **Chiti, A.**, Milone, A. P., Da Costa, G., Mackey, D., Frebel, A. L., Conn, B., *Portrait of a Dark Horse: a Photometric and Spectroscopic Study of the Ultra-faint Milky Way Satellite Pegasus III*, 2016, **ApJ**, 833, 16.
1. Ji, A. P., Frebel, A. L., Simon, J. D., **Chiti, A.**, *Complete Element Abundances of Nine Stars in the r-process Galaxy Reticulum II*, 2016, **ApJ**, 830, 93.