Rana Ezzeddine

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EMPLOYMENT

Assistant Professor — Jan 2020 - present
Department of Astronomy,
University of Florida
Gainesville, FL

Postdoctoral Fellow — 2016-2019
JINA-CEE postdoctoral Fellow
Kavli Institute for Astrophysics and Space Research
Massachusetts Institute of Technology
Cambridge, MA, USA

Postdoctoral Fellow — 2019
Heising-Simons MIT Physics Fellow
Kavli Institute for Astrophysics and Space Research
Massachusetts Institute of Technology
Cambridge, MA, USA

EDUCATION

Ph.D in Physics
Université de Montpellier, France — 2012-2015

Master of Sciences in Astrophysics — 2010-2012
Joint degree: Notre Dame University, Lebanon
& Université de Saint Joseph, Lebanon

Bachelor of Sciences in Physics
Lebanese University, Lebanon — 2005-2008

AWARDS AND HONORS

Heising-Simons Physics Research Fellowship - MIT	2019
Co-I. NASA Hubble Space Telescope - GO-15951	2019-2023
Co-I. NASA Hubble Space Telescope - GO-15657	2018-2022
Co-I., NASA Hubble Space Telescope - GO-14151	2016-2019
JINA-CEE postdoctoral fellowship - MSU/MIT	2016-present
IAU symposium 334 poster 1st prize award	2017
IAU travel grant for Symposium 334	2017
MIT Spot Award	2017
PHC CEDRE grant (France) - Project number 32919SL: 3400 €	2015
1M CPU hours - FRANCE-GRILLES/DIRAC grid	2014-2015
University of Montpellier PhD fellowship	2012-2015
CNRS-Lebanon PhD fellowship	2012-2015
Masters Graduate Fellowship - Notre Dame University, Lebanon	2011-2012

TEACHING & RESEARCH MENTORING

Teaching: Graduate level core courses
AST 6245 : Radiative Transfer & Stellar Atmospheres — Fall 2021
(*University of Florida, Gainesville, FL*)

AST 6215 : Stars and the Galaxy — Spring 2020, Spring 2021
(*University of Florida, Gainesville, FL*)

Teaching: Undergraduate level courses — 2011-present
Quest 2/IDS 2935: "Stars and the Nuclear Arms Race" — Spring 2022
(*University of Florida, Gainesville, FL)*

Astronomy 101: "Introduction to the Solar System" — *2011-2012*
(Notre Dame University, Louaize, Lebanon)

General Physics Lab Teaching Fellow — *2011-2012*
(Notre Dame University, Louaize, Lebanon)

Electricity and Magnetism Physics Lab Teaching Fellow — *2011-2012*
(Notre Dame University, Louaize, Lebanon)

Teaching: Highschool level — *2008-2012*
Beirut Modern School, *(Beirut, Lebanon)*
Amjad College, *(Beirut, Lebanon)*

Research Mentoring of Graduate research — *2020-present*
Shivani Shah (PhD student, University of Florida)
Yangyang Li (PhD student, University of Florida)
Nicholas Barth (PhD student, University of Florida)
Francisco Mendez (PhD student, University of Florida)

Research Mentoring of Undergraduate & Highschool research

University of Florida, Gainesville, FL

- *Jeremy Kowkabany* — *Spring 2020 - present*
- *Zoe Hackshaw* — *Spring 2020 - present*
- *Natalia Wolschlager* — *Spring 2020 - Summer 2021*
- *Jonathan Roberts* — *Fall 2021*
- *Victoria Moore* — *Spring 2021*
- *Daniel Warschofsky* — *Spring 2021 - present*
- *Nima Aria* — *Summer 2021 - present*

Massachusetts Institute of Technology, Cambridge, MA

- *Fouad Chahrour (Fullbright Fellow, Germany/Harvard)* — *2018 - 2019*
- *Subhash Kantamneni (RSI highschool student summer research)* — *Summer 2019, Final Presentation (Link)*
- *Xinmiao (Anna) Hu (Undergraduate exchange summer research, Imperial College London/UK)* — *Summer 2019*

Summer School Lectures
MIT Undergraduate Research Opportunities Program students (UROP) — *2017*
"Introduction to Radiative Transfer in Stellar Atmospheres"

COMPETITIVELY AWARDED OBSERVING TIME

Co-Investigator - Keck Telescope (0.5 nights total) — *2021*
"New Uranium Lines for Nucleocosmochronometry"

Principal Investigator - Gran Telescopio Canarias (50 hrs total) — *2019-2020*
"Characterizing r-process nucleosynthesis models of enhanced r-process stars"

Co-Investigator - Gran Telescopio Canarias (12 hrs total) — *2019-2020*
"Characterizing Extremely Metal Poor Stars from DESI"

Co-Investigator - McDonald Observatory 2.7 m Telescope (12 nights) — *2019-2020*

Co-Investigator - Hubble Space Telescope (GO-15951, 17 orbits) *2020-2022*
"Testing r-process nucleosynthesis models with two r-process enhanced stars"
Co-Investigator - Hubble Space Telescope (GO-15657, 37 Orbits) *2019-2021*
"HD 222925: A unique opportunity to study the full range of nuclei produced by a single r-process event"
Principal Investigator - Magellan Clay Telescope (>30 nights total) *2016-2019*
"Characterizing the population of r-process stars in the Galactic Halo"
Co-Investigator - Magellan Clay Telescope (2 nights) *2018*
"J0023−0307: A rare second-generation star with [Fe/H]< −6"
Co-Investigator - Magellan Clay Telescope (8 nights) *2016-2017*
"Discovering the most metal-poor stars from the SkyMapper Survey"
Co-Investigator - Hubble Space Telescope (GO-14151, 24 Orbits) *2015-2018*
"Constraining Pop III supernova energies and the formation of the first low-mass stars with the iron-poor star HE 1327−2326"

INVITED SCIENTIFIC TALKS

Astronomy Seminar *(Virtual) (Université Libre de Bruxelles, Belgium, 2021)*
Physics Colloquium *(Virtual) (High Altitude Observatory , CO, 2021)*
AAS Journal author Youtube series *(with ApJ editor Frank Timmes, Link)*
Astrophysics Colloquium *(Virtual) (University of New South Wales Sydney, 2020)*
Astrophysics Colloquium *(Virtual) (Carnegie Observatories, CA, 2020)*
Online Webinar *(JINA-CEE, Link)*
Astrophysics Colloquium *(Massachusetts Institute of Technology, MA, 2019)*
Astronomy Seminar *(Brandeis University, MA, 2019)*
Astronomy Seminar *(University of Texas A&M, TX, 2019)*
Astronomy Seminar *(University of Notre Dame, IN, 2019)*
Astrophysics Colloquium *(University of Florida, FL, 2019)*
Lunch Seminar *(Harvard CfA, ITC, MA, 2018)*
Astrophysics Seminar *(Pontifical Catholic University of Chile, Chile, 2018)*
Eleventh International Conference on Atomic and Molecular Data and Their Applications - *(Cambridge, MA, 2017)*
The Metal poor Galaxy Meeting - *(Ringberg, Germany, 2017)*
FRIB and the GW170817 kilonova - *(Lansing, MI, 2017)*
Physics Colloquium - *(American University of Beirut, Beirut, Lebanon, 2017)*
Stellar Astrophysics Seminar - *(University of Heidelberg, Germany, 2016)*
JINA-CEE online webinar - *(Link)*
Astrophysics Seminar - *(Michigan State University, East Lansing, MI, 2016)*
Astrophysics Seminar - *(Université Libre de Bruxelles, Belgium, 2016)*

CONTRIBUTED SCIENTIFIC TALKS

CEMP stars as probes of First stars Nucleosynthesis - *Geneva, Switzerland*
JINA-CEE 2019 Frontiers meeting - *East Lansing, MI*
Galactic Archeology as time machines to the First stars - *Tokyo, Japan*
Cool stars 20 *(plenary session, Link)* - *Boston, MA, USA*
IAU symposium 334 1st prize poster award talk - *Potsdam, Germany*
JINA-CEE Frontiers meeting (Junior workshop) - *Lansing, MI, USA*
MIT Kavli Institute postdoc symposium - *MIT, Cambridge, MA*
JINA-CEE Frontiers meeting - *South Bend, IN*
The Milky Way's History WE-Heraeus-Seminar - *Bad Honnef, Germany*
Annual meeting of the French Society of Astronomy & Astrophysics - *Montpellier, France*

INVITED OUTREACH TALKS & PANELS

Panelist, Speaker - *STEM FOR HER Morocco workshop (virtual)* *2021*
Panelist, Speaker - *Lebanese Women in Astronomy (virtual)* *2021*
Panelist - *JINA-Horizons Junior Workshop (virtual)* *2021*

"Transitioning to an assistant professor position"
Speaker, Lecturer - *Western Pines Middle Astronomy (virtual)* *2021*
Speaker - *"Galactic Getaway", Science in Every Florida School (virtual)* *2020*
Panelist, Speaker - *Festival d'Astronomie de Fleurance (Fleurance, France) (virtual)* *2020*
Speaker - *Moon Shots: Apollo 11th 50th anniversary (MIT Museum)* *2019*
"Insights into the lives (and deaths) of the oldest stars"
Speaker - *"Exciting Astronomy Questions" (Tokyo, Japan)* *2018*
Speaker - *Science Café (Beirut, Lebanon)* *2017*
"Where do elements in the Universe come from?"
Speaker - *Astronomy on Tap (Boston, MA)* *2017*
"How is gold (and other heavy elements) made in stars?"

PROFESSIONAL ACTIVITIES

Conference Organizing Committees

SOC (chair) - *GTC Science meeting* *2022*
Working group organizer - *JINA-Horizons on Nuclear Astrophysics* *2022*
LOC - *JINA-CEE frontiers meeting* *2019*
LOC - *JINA-CEE frontiers meeting* *2018*
LOC - *Cool stars 20* *2018*

Panel Review Committees

External Reviewer - *Hubble Space Telescope Cycle 29* *2021*
Review Panelist - *NASA TCAN* *2020*
External Reviewer - *NASA Postdoctoral Program* *2019-2020*
Review Panelist - *Hubble Space Telescope Cycle 28* *2020*
Review Panelist - *NASA Astrophysical Theory Program* *2019*
Review Panelist - *Hubble Space Telescope Cycle 27* *2019*
External Reviewer - *NASA FINESST* *2019*
Reviewer - *Heising Simmons Physics Research Fellows, MIT* *2018*
External Reviewer, *Canada-France-Hawaii Telescope* *2017*

Publication Refereeing *2017-present*

Astronomy & Astrophysics
Nature Astronomy
The Astrophysical Journal
Monthly Notices of the Royal Astronomical Society

Department and University Service

(University of Florida) -
Graduate Mentoring committee (chair) *present*
GTC Users committee (member) *2020-present*
Faculty Hiring committee (co-chair) *2021*
Graduate Admission committee (member) *2020-2021*

(Massachusetts Institute of Technology) -
Seminar organizer - *Brown Bag Lunch talk series, MIT* *2017-2019*
Organizer - *Postdoc lunch series, MIT* *2016-2017*
Co-organizer - *MIT Kavli Institute postdoc symposium* *2016*

OUTREACH, DIVERSITY & INCLUSION, & SCIENCE COMMUNICATION

Leading Roles

Co-creator, organizer - *Astronomy on Tap, Boston Series* *2017-present*
Co-creator - *Lebanese Astronomical Society* *2020-present*
Co-creator - *Lebanese Astronomy group* *2006-present*
Co-organizer - *Beirut Science Days* *2006-2012*
Organizer - *Solar eclipse and astronomy day (France)* *2014*
Organizer - *International year of Astronomy 2009 (Lebanon)* *2009*
Organizer - *100 hours of Astronomy (Lebanon)* *2009*

Events/ Public Talks

Speaker - *Astronomy on Tap (Cambridge, MA)* *2017*
"How to find the oldest stars in the Universe?"
Speaker - *"How to become a scientist?" (Potomac High school)* *2017*
Panelist, Speaker - *STEM FOR HER Morocco workshop (virtual)* *2021*
Panelist, Speaker - *Lebanese Women in Astronomy (virtual)* *2021*
Panelist - *JINA-Horizons Junior Workshop (virtual)* *2021*
"Transitioning to an assistant professor position"
Speaker, Lecturer - *Western Pines Middle Astronomy (virtual)* *2021*
Speaker - *"Galactic Getaway", Science in Every Florida School (virtual)* *2020*
Panelist, Speaker - *Festival d'Astronomie de Fleurance (Fleurance, France) (virtual)* *2020*
Speaker - *Moon Shots: Apollo 11th 50th anniversary (MIT Museum)* *2019*
"Insights into the lives (and deaths) of the oldest stars"
Speaker - *"Exciting Astronomy Questions" (Tokyo, Japan)* *2018*
Speaker - *Science Café (Beirut, Lebanon)* *2017*
"Where do elements in the Universe come from?"
Speaker - *Astronomy on Tap (Boston, MA)* *2017*
"How is gold (and other heavy elements) made in stars?"

MEDIA & PRESS RELEASES

University of Florida TED Fellow *2022*
BBC's PBS NOVA "Universe" *documentary series - Interviewee* *2022*
Florida Museum of Natural History – *2020*
Indiana Jones of the Galaxy Teaches Students About the Wonders of the Night Sky
FOX 5 – *2019*
Evidence of 14B year-old 'time machine' star found 35,000 light-years from Earth
Pour La Science – *2019*
Des jets puissants pour la mort des premières étoiles
Science et Vie – *2019*
Astrophysique : l'explosion des premières étoiles a nourri l'Univers
Scientific American – *2019*
The Universe's First Stars Exploded in Strange Ways
IPMU Press Release – *2019*
Explosions of universes first stars spewed powerful jets
SyfyWIRE – *2019*
*When the first stars in the Universe exploded, they *really* exploded*
Newsweek – *2019*
The Universe's First Stars Exploded, Sending Out Powerful Jets That Produced New Ones
TechTimes – *2019*
First Stars In The Universe Were Short-Lived And Ejecting Giant Jets Of Matter
Astronomy Magazine – *2019*
The universe's first supernovae spewed jets of material into nearby galaxies

MIT Press Release – *2019*
Explosions of universes first stars spewed powerful jets
"Cosmic Front: Next Generation" *documentary series - Interviewee* *2017*

LANGUAGES

Arabic (native): read, written, spoken
English (quadrilingual): read, written, spoken
French (quadrilingual): read, written, spoken
German (quadrilingual): read, written, spoken
Spanish : read and spoken

LIST OF PUBLICATIONS

Full list of publications can be accessed at:
- NASA ADS *(Link) citations = 390, h-index= 11*
- Google Scholar *(Link) citations = 428, h-index= 12, i10-index=14*

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LIST OF PUBLICATIONS

9 First and Second author published and submitted papers
(asterisk denotes paper written with underlined Graduate or Undergraduate student)

9- Kowkabany J., **Ezzeddine R.**, Charbonnel, C., Hackshaw Z. et al. 2021, **ApJ submitted** - *"Discovery of an Ultra Li-rich Red Giant Metal-poor Star"**

8- Hackshaw Z., **Ezzeddine R.**, Kowkabany J., Shah S., et al., **ApJ submitted** *"The R-Process Alliance : Evidence of accretion of a highly enhanced r-process star from a satellite of the LMC"**

7- Li Y. , **Ezzeddine R.**, **ApJ submitted** *"LOTuS: a non-LTE Optimizing Tool for derivations of atmospheric Stellar parameters"**

6- **Ezzeddine R.**, Rasmussen K., Chiti A., Frebel A., et al. 2020, **ApJ**, 898, 150E
*"The R-Process Alliance : High resolution Magellan/MIKE data release from the Southern search for r-process enhanced stars in the Galactic Halo"**

5- **Ezzeddine R.**, Frebel A., Roederer I. U., Tominaga T., Tumlinson J., Ishigaki M., Nomoto K., Placco V. M., Aoki W., 2019, **ApJ**, 876, 97E
"Evidence for an aspherical Population III supernova explosion inferred from the Hyper-Metal-Poor star HE 1327−2326"

4- **Ezzeddine, R.**, Merle T., Plez, B. et al. 2018, **A&A**, 618, A141
"An empirical recipe for inelastic hydrogen-atom collisions in non-LTE calculations"

3- **Ezzeddine R.** & Frebel A., 2018, **ApJ**, 863, 168E
"Revisiting the Iron Abundance in the Hyper Iron-poor Star HE 1327−2326 with UV COS/HST Data"

2- **Ezzeddine R.**, Frebel A. and Plez B., 2017, **ApJ**, 847, 142E
"Ultra-metal-poor Stars: Spectroscopic Determination of Stellar Atmospheric Parameters Using Iron Non-LTE Line Abundances"

1- **Ezzeddine R.**, Merle T. and Plez B., 2016, **AN**, 337, 850E
"Non-LTE iron abundances in cool stars: The role of hydrogen collisions"

19 total co-Authored papers

19- Judge P., Rempel M., **Ezzeddine, R**, Kleint L., Egeland, R. et al., 2021, **ApJ**, 917, 27J - *"Measuring the magnetic origins of solar flares, CMEs and Space Weather"*

18- Gudin D., Shank D., Beers T., including **Ezzeddine, R**, 2021, **ApJ**, 908, 79G - *"The R-Process Alliance: Chemodynamically Tagged Groups of Halo r-process-enhanced Stars Reveal a Shared Chemical-evolution History"*

17- Roederer I. U., Lawler, J., Holmbeck, E., Beers, T., **Ezzeddine, R** et al., 2020, **ApJ**, 902L, 24R - *"Detection of Pb II in the Ultraviolet Spectra of Three Metal-poor Stars "*

16- Holmbeck, E. M., Hansen, T. T. et al. including Ezzeddine, R., 2020, **ApJS**, 249, 30H - *"The R-Process Alliance: Fourth Data Release from the Search for R-process-enhanced Stars in the Galactic Halo"*

15- Rasmussen K.C., Frebel A., **Ezzeddine R.**, Ji A.P., Chiti A, Beers T., Hansen T.T., Placco V.M., Roederer I.U., Sakari C., **ApJ** submitted - *"The R-Process Alliance: A Uranium abundance measurement in the r-I star BD+17°3248"*

14- Cain M., Frebel A. , Ji A.P., Placco V. M., **Ezzeddine R.**, Roederer I. U., Hattori K., Beers T., Meléndez J., Hansen, T., Sakari C., 2020, **ApJ**, 898, 40C - *"The R-Process Alliance: J1521−3538, A very metal-poor extremely r-process enhanced star with [Eu/Fe] = +2.2, and the class of r-III stars"*

13- Placco, V. M., Santucci, R. M. et al. including **Ezzeddine, R.**, 2020, **ApJ**, 897, 78P - *"The R-process Alliance: The Peculiar Chemical Abundance Pattern of RAVE J183013.5−455510"*

12- Nidever, D. L., Price-Whelan, A. M., Choi, Y.; Beaton, R. L., Hansen, T. T., Boubert, D., Aguado, D., **Ezzeddine R.**, Oh, S., Evans, N. W., 2019, **ApJ**, 887, 115N - *"Spectroscopy of the Young Stellar Association Price-Whelan 1: Origin in the Magellanic Leading Arm and Constraints on the Milky Way Hot Halo"*

11- 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. and Yong D., **MNRAS**, 488L, 109N - *"The lowest detected stellar Fe abundance: The halo star SMSS J160540.18−44323.1"*

10- Sitnova T., Mashonkina L., **Ezzeddine R.**, Frebel A. 2019, **MNRAS**, 485, 3527S - *"Ultra metal-poor stars: improved atmospheric parameters and NLTE abundances of magnesium and calcium"*

9- Sakari C., Roederer I., Placco V., Beers T., **Ezzeddine R.** et al. 2019, **ApJ**, 874, 148S - *"The R-Process Alliance : Discovery of a low α, r-process enhanced metal-poor star in the Galactic halo"*

8- Frebel A., Ji, A., **Ezzeddine R.**, et al. 2019, **ApJ**, 871, 146F - *"Chemical abundance Signature of J0023+0307 – A Second-Generation Main-Sequence Star with [Fe/H]< -6"*

7- Placco V. M et al. including **Ezzeddine, R.** 2019, **ApJ**, 870, 122P - *"The R-Process Alliance: Spectroscopic Follow-up of 857 Low-Metallicity Star Candidates from the Best & Brightest Survey"*

6- Sakari C., Placco V., Farrell E., Roederer I., Wallerstein G., Beers T., **Ezzeddine R.** et al. 2018, **ApJ**, 68, 110S - *"The R-Process Alliance: First Release from the Northern Search for r-Process Enhanced Metal-Poor Stars in the Galactic Halo"*

5- Roederer I., Sakari C., Placco, V., Beers, T., **Ezzeddine, R.** at al. 2018, **ApJ**, 865, 129R - *"The R-Process Alliance: A Comprehensive Abundance Analysis of HD 222925, a Metal-Poor Star with an Extreme R-Process Enhancement of [Eu/H]=*

-0.14"

4- Cain M., Frebel A., Gull M., Ji A., Placco V., Beers T., Meléndez J., **Ezzeddine R.**, et al. 2018, **ApJ**, 864, 43C - *"The R-Process Alliance: Chemical Abundances for a Trio of r-process-enhanced StarsOne Strong, One Moderate, and One Mild"*

3- Gull, M., Frebel A., Cain M., Placco V., Ji A., Abate C., **Ezzeddine R.** et al. 2018, **ApJ**, 862, 174G - *"The R-Process Alliance: Discovery of the First Metal-poor Star with a Combined r- and s-process Element Signature"*

2- Placco V., Holmbeck E., Frebel A., Beers T., Surman R., Ji A., **Ezzeddine R.** 2017, **ApJ**, 844, 18P - *"RAVE J203843.2-002333: The First Highly R-process-enhanced Star Identified in the RAVE Survey"*

1- Ji A., Frebel A., **Ezzeddine R.** & A. Casey, 2017, **ApJ**, 832L, 3J - *"Chemical Diversity in the Ultra-faint Dwarf Galaxy Tucana II"*

PROCEEDING & WHITE PAPER PUBLICATIONS

5- Roederer I. U., Beers T. C., **Ezzeddine, Rana** et al., **Astro2020: Decadal Survey on Astronomy and Astrophysics**, 2019, Vol. 51, Issue 3, id. 136 - *"The astrophysical r-process and the origin of the heaviest elements"*

4- Aprahamian A. et al. including **Ezzeddine R.**, 2018, Proceedings for the FRIB Theory Alliance workshop, arXiv:1809.00703 - *"FRIB and the GW170817 kilonova"*

3- **Ezzeddine R.**, Sitnova T., Frebel A., Mashonkina L., Plez B., 2018, IAU symposium 334 Conference proceeding, 259E - *"Mega (metal-poor) not so much: Non-LTE spectroscopic stellar parameters and abundance determination of Ultra metal-poor stars"*

2- **Ezzeddine, R.**, Merle T. & Plez B., 2013, "New Advances in Stellar Physics: From Microscopic To Macroscopic Processes" EAS conference proceedings, 63, 407E - *"NLTE Iron abundance determination in Red Giants"*

1- **Ezzedine, R.**, Merle T., Plez B., 2013, Proceedings of the Annual meeting of the French Society of Astronomy and Astrophysics, 119E - *"Non-LTE Iron abundance determination of a sample of Kepler Red Giants"*