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, 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 (*$42,721 to UF*) — 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 — 2016-2019
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

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*
Basic Physics grade 7 - grade 10 level classes
- *Beirut Modern School, Beirut, Lebanon*
- *Amjad College, Beirut, Lebanon*

STUDENT RESEARCH & MENTORING

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,* — *Summer 2019*
Imperial College London/UK)

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) (Lebanese Astronomical Association, 2021)*
Astronomy Seminar *(Virtual) (Université Libre de Bruxelles, Belgium, 2021)*
Physics Colloquium *(Virtual) (High Altitude Observatory , CO, 2021)*
AAS Journal author Youtube series *(Virtual) (2020, Link)*
Astrophysics Colloquium *(Virtual) (University of New South Wales Sydney, 2020)*
Astrophysics Colloquium *(Virtual) (Carnegie Observatories, CA, 2020)*
Online Webinar *(Virtual) (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 & DIVERSITY TALKS

Podcast Interview - *NOVA NOW/PBS, Interview Dr. Alok Patel (virtual)* *2021*
Speaker - *World Space Week, Women in Space, Lebanon (virtual)* *2021*
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* *2021*
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 Independent Activities Period* *2017*
Co-organizer - *MIT Kavli Institute postdoc symposium* *2016*

OUTREACH, DIVERSITY & INCLUSION, & SCIENCE COMMUNICATION

Leading Roles
Organizer - *Solar eclipse and astronomy day (France)* *2014*
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 - *International year of Astronomy 2009 (Lebanon)* *2009*
Organizer - *100 hours of Astronomy (Lebanon)* *2009*

Events/ Public Talks
Podcastor - *NOVA NOW/PBS, Interview w/ Dr. Alok Patel (virtual)* *2021*
Speaker - *World Space Week, Women in Space, Lebanon (virtual)* *2021*
Panelist, Speaker - *STEM FOR HER Morocco workshop (virtual)* *2021*
Panelist, Speaker - *Celebrating 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?"
s **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 MIT visit)* *2017*
Speaker - *Astronomy on Tap (Boston, MA)* *2017*
"How is gold (and other heavy elements) made in stars?"

MEDIA & PRESS RELEASES

PBS NOVA NOW podcast, *Interview with Dr. Alok Patel* *Oct. 2021*
BBC's PBS NOVA TV documentary "Universe Unveiled" *Oct. 2021*
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 the links below:

- 33 total, 9 first and second author, 19 co-authored publications, 5 proceeding and white papers
- NASA ADS *(Link) citations = 415, h-index= 12*
- Google Scholar *(Link) citations = 440, h-index= 12, i10-index=14*

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

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"*