

CONTACT  
INFORMATION

Dept. of Astrophysical and Planetary Sciences  
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## EDUCATION

**Ph.D. in Physics** December 2021  
 Physics Department, University of Texas at Arlington  
 • Dissertation: [Orbital Evolution Studies and Radio Searches of Extra-Solar Moons](#)  
 UTA Thesis Advisor: Dr. Zdzislaw Musielak  
 NRAO Reber Fellowship and Thesis Co-Advisors: Dr. Bryan Butler & Dr. Amy Kimball

**Bachelor of Science in Applied Physics (Electronics)** 2014  
 Department of Applied Physics, University of Puerto Rico at Humacao

ACADEMIC  
APPOINTMENTS

**Teaching Assistant Professor** Sep 2022 - Present  
 Department of Astrophysics and Planetary Sciences, University of Colorado Boulder

**Gröte Reber Research Fellow** – Dr. Butler & Dr. Kimball Sep 2018 - Dec 2021  
 National Radio Astronomy Observatory (NRAO)  
 Search for Extra-solar Moons in Radio Wavelengths  
 • Led extrasolar planet-moon surveys in radio wavelengths using GMRT & LWA radio telescopes  
 • Analyzed low-frequency interferometric data using AIPS and CASA and established upper limits for planets with moon-powered emissions

**Astronomy Research Intern** – Prof. Stassun & Dr. Cargile Jun 2014 - Sep 2014  
 Department of Physics and Astronomy, Vanderbilt University  
 vis.SME-Building a Visualization Tool for Stellar Spectra  
 • Developed a web-based tool to visualize, analyze and share stellar characterization outputs from the spectral synthesis software SME@XSEDE

**Summer REU Intern** – Prof. Stassun & Dr. Cargile May 2013 - Aug 2013  
 Department of Physics and Astronomy, Vanderbilt University  
 Spectral Synthesis: Stellar Characterization for Kepler Candidates  
 • Analyzed the output results of SME@XSEDE for ~ 300 Kepler star candidates

**Summer REU Intern** – Prof. Stassun & Dr. Cargile May 2012 - Aug 2012  
 Department of Physics and Astronomy, Vanderbilt University  
 Stellar Chronometry-Collinder 135  
 • Used PSF photometry to reduce data from an optical survey of the cluster Collinder 135  
 • Achieved preliminary results of the ages for stars within the cluster by placing them on color-magnitude diagrams

**Undergraduate Research Assistant** – Prof. Muller July 2009 - May 2014  
[Observatorio Astronómico de UPR Humacao](#)  
 Departamento de Física y Electrónica, Universidad de Puerto Rico en Humacao  
 Observation and Reports on Position Angle and Separation of Binary Stars  
 • Collected data at the 31-in National Undergraduate Research Observatory (NURO) Telescope at the Anderson Mesa location of Lowell Observatory, Arizona  
 • Calculated position angle and separation of 150+ binary star systems a year

TEACHING &  
EXPERIENCE

**Instructor: Teaching Assistant Professor**

*CU Boulder's Astrophysics & Planetary Science Department*

- ASTR2000 Ancient Astronomies of the World, 1 section, 166 students Spring 2024
- ASTR1020 Stars and Galaxies with Recitation, 1 section, 61 students Spring 2024
- ASTR1200 Stars and Galaxies, 1 section, 103 students Spring 2024
- ASTR2000 Ancient Astronomies of the World, 1 section, 162 students Fall 2023
- ASTR1000 Solar System, 1 section, 200 students Fall 2023
- ASTR1010 Introductory Astronomy I, 1 section, 203 students Fall 2023
- ASTR1000 Solar System, 2 sections, 396 students Spring 2023
- ASTR1020 Introductory Astronomy II, 1 section, 65 students Spring 2023
- ASTR1000 Solar System, 2 sections, 414 students Fall 2022
- ASTR1010 Introductory Astronomy I, 1 section, 205 students Fall 2022

**Graduate Teaching Assistant**

*UTA's Physics Department*

- PHYS-1446 Astronomy II Lab, 1 section, 14 students Summer 2018
- PHYS-1445 Astronomy I Lab, 2 sections, 25 students Summer 2018
- PHYS-1444 Electricity and Light Lab, 45 students Spring 2018
- PHYS-1444 Electricity and Light Lab, 2 sections, 70 students Fall 2017
- PHYS-1444 Electricity and Light Lab, 30 students Fall 2014

ADVISING &  
SUPERVISION

**Undergraduate Research Mentees**

*Moon Radio Frequencies (MRF) Research Group – University of Colorado Boulder*

- Rosilio A. Roman Maysonet Jan 2024 - Present
- Project: "Data Reduction and Analysis of Sub-stellar Surveys at Low Frequencies"

*Exoplanet Research Group – University of Texas at Arlington*

- Lindsey Boyle Sep 2019 - Dec 2022  
Honors Thesis: "Stability of Triple Stellar Systems with Exoplanets"
- Jasmine Hawk Sep 2019 - May 2021  
Project: "Determining Incident Flux of Radio Emission from Brown Dwarfs"
- Sanskruti Sharma June 2018 - May 2020  
Honor's Thesis: "Detection of Exomoons by Decametric Radio Emissions and Determination of their Habitability through Tidal Heating"
- Sergio Garza Sep 2016 - Sep 2018  
Project: "Improving Habitability of Earth-sized Proxima Centauri b by an Exomoon"
- Niyousha Davachi Sep 2016 - Sep 2018  
Project: "Stable Orbits for Exomoons in Kepler-452b Orbiting a Sun-like Star"

PROFESSIONAL  
SERVICE

**Referee**

- *Reviewer*, Astronomy and Computing Journal, ELSEVIER Dec 2023

**Workshops**

- *Facilitator*, Our Dynamic Earth for Primary School Educators, Sonora, Mexico Nov 2023
- *Instructor*, Taller Futur@ Astronom@, UPRH's Observatory Jul 2023
- *Facilitator*, AAS NASA PUNCH Eclipse Tools for Educators Jun 2023
- *Instructor*, Taller Futur@ Astronom@, UPRH's Observatory Jun 2022
- *Instructor*, Taller Futur@ Astronom@, UPRH's Observatory Jun 2021
- *Facilitator*, [APS National Mentoring Community Conference](#) Oct 2016

**Committees**

- *Member*, Kevin Ortiz's Undergraduate Honors Thesis, UPR Río Piedras May 2021
- *Panelist*, APS National Mentoring Community Conference Oct 2016

**Scientific Blog**

- *Scientific Author*, Astrobites' sister page in Spanish ([Astrobites](#)) 2015 - 2021

**INSTITUTIONAL  
SERVICE****University of Colorado Boulder – Astrophysics and Planetary Sciences (APS) Department**

- *Program PI*, Hispanic Outreach with Fiske and the Observatory ([HOFO](#)) Present
- *Faculty Mentor*, 5 undergraduate students Spring 2024
- *Committee Member*, Fiske Planetarium Advisory Spring 2024
- *Comprehensive Exam Committee Member*, 2 graduate students Fall 2023
- *Faculty Mentor*, 6 undergraduate students Fall 2023
- *Committee Member*, Graduate Admissions Fall 2023
- *Committee Member*, Fiske Planetarium Advisory Fall 2023
- *Facilitator*, Astronomy Day Fiske Planetarium Spring 2023
- *Faculty Mentor*, 2 undergraduate students Spring 2023
- *Committee Member*, Undergraduate Curriculum & Concerns Spring 2023

**University of Texas at Arlington – Physics Department**

- *Vice-President*, UTA's Physics Graduate Student Association 2015 - 2017

**University of Puerto Rico at Humacao – Applied Physics (Electronics) Department**

- *Webmaster*, UPRH's Astronomical Observatory 2011 - 2014

**GRANTS**

- **PI**, "Astronomy and Physics Engagement with Boulder's Hispanic / Latinx Community", CU Boulder's Tier 3 Public and Community-Engaged Scholarship Grant. 2023-24. \$8,000.
- **Co-I**, "Cross-Cultural Public Engagement On and Off the Eclipse Path with NASA PUNCH Outreach", AAS Education & Professional Development Mini-Grant. 2023–2024. \$4,000.

**HONORS &  
AWARDS  
(SELECTED)****University of Colorado Boulder**

- CU Next Faculty Cohort Member Sep 2023 - Present

**National Radio Astronomy Observatory (NRAO)**

- Gröte Reber Doctoral Fellowship Sep 2018 - Dec 2021
- 16<sup>th</sup> Synthesis Imaging Workshop May 2018

**University of Michigan**

- Next Professor Science Workshop May 2021

**American Astronomical Society**

- International Travel Grant –\$1,000 July 2019
- Division of Planetary Science (DPS) Hartmann Travel Grant –\$500 May 2019

**University of Texas at Arlington (UTA)**

- James L. Horwitz Physics Scholarship –\$1,000 May 2021
- Dr. John L. Fry Endowment for the Department of Physics –\$600 May 2020
- James L. Horwitz Physics Scholarship –\$1,000 July 2019
- College of Science Dean's Excellence Award –\$2,000 Jan 2018
- Truman D. Black Endowed Scholarship in Physics –\$650 Apr 2017
- LSAMP Bridge Program Fellowship Jan 2015 - May 2017

**NASA Exoplanet Science Institute**

- Sagan Exoplanet Workshop Jul 2015

**OUTREACH &  
MEDIA  
APPEARANCES**

- **Materials Consultant & Translator**, NASA's PUNCH Mission Outreach Team Present
- **Education Materials Consultant & Translator**, NASA's STS Outreach Team Present
- **Public Talk Presenter**, *Cielo para Principiantes*, AAVSO Talk Series Aug 2023
- **Narrator**, NASA's Science Through Shadows "What causes eclipses?" (*ES Ver.*) Jul 2023
- **Panelist**, 243 AAS Meeting Public Event: Solar Eclipses in Albuquerque! Jun 2023
- **Eclipse Witness**, NASA's Science Through Shadows "Eclipse Total del Sol" May 2023

- **Special Guest** [KGNU Connections Show](#), CU Astronomy Day Announcement Apr 2023
- **Featured Scientist**, Moon Packing Project, UTA COS [Press Release](#) Oct 2022
- **Astronomical Observation Guide**, Explorando Senderos Camp, Boulder CO Aug 2022
- **Special Guest**, [Ask an Astronomer Podcast](#), UTA Planetarium Sep 2021
- **Panel Speaker**, [Path to Specialization in Astronomy](#), UPRH's Observatory May 2021
- **Featured Scientist**, Exomoon Constraints, Georgia Tech COS [Press Release](#) Oct 2020
- **Featured Scientist**, Exomoon Constraints Project, UTA COS [Press Release](#) Oct 2020
- **Featured Scientist**, Stability of Exomoons Project, UTA COS [Press Release](#) May 2020
- **Featured Scientist**, Space's Deepest Secrets S6 E4: "[Finding Alien Moons](#)" Apr 2019
- **Public Talk Presenter**, "The Detection of Exomoons", UPRH's Observatory Oct 2019
- **Featured Scientist**, Strip the Cosmos S3 E9: "Hunt for the Missing Moons" Dec 2018
- **Featured Fellow**, Reber Fellowship Announcement [UTA Press Release](#) Aug 2018
- **Featured Fellow**, Reber Fellowship Announcement [AAAS Press Release](#) Aug 2018

OBSERVATIONAL  
PROPOSALS

- PI**, Low Wavelength Array (LWA), "Search for Extra-Solar Moons in 2 Nearby Stellar Systems" Cycle 7, 380 allocated hours.
- Co-I**, Giant Metrewave Telescope (GMRT), "Search for Extra-Solar Moons in 2 Nearby Stellar Systems" Cycle 28, 9 allocated hours.
- Co-I**, National Undergraduate Research Observatory (NURO), at Lowell Observatory, "Separation and Position Angle of Binary Stars" Fully allocated 200+ hours.

## INVITED TALKS

- Expandiendo la conexión entre la naturaleza y el cosmos** Nov 2023  
Universidad Estatal de Sonora Congreso X de Ecología, Sonora, Mexico
- Orbital Stability Studies and Applications to Exomoon Candidates** May 2021  
UNESP Orbital Dynamics and Planetology Virtual Seminar,
- Searching for Exo-lunar Emissions in Nearby Stellar Systems** Dec 2019  
Murchison Widefield Array (MWA) Project Meeting, Tempe, AZ
- Orbital Evolution and Radio Searches of Extra-Solar Moons** Oct 2019  
Florida State University Astrophysics Seminar, Tallahassee, FL
- Orbital Evolution and Radio Searches of Extra-Solar Moons** Oct 2019  
UNM's Center for Astrophysics Research Seminar, Albuquerque, NM
- Searching for the First Exomoon in the Radio** Feb 2018  
Dallas County Community College (TCC) Eastfield College STEM INAR, Dallas, TX

CONFERENCE  
PROCEEDINGS

## Oral Presentations

- [6] 2020. **Rosario-Franco, M.**, Orbital Stability of Exomoons and Submoons with Applications to Kepler 1625b-I. 51st AAS Division of Dynamic Astronomy, Abstract id #300.06
- [5] 2020. **Rosario-Franco, M.**, Searching for extra solar planet-moon interactions with LWA. Long Wavelength Array User's Meeting 2020.
- [4] 2019. **Rosario-Franco, M.**, Kodilkar, J., Musielak, Z., Kimball, A., Butler, B. Analyzing GMRT Data in Search of Exomoon Radio Emissions. AAS Division of Planetary Science and European Planetary Science Congress Joint Meeting 2019. Abstract id # EPSC-DPS2019-1890.
- [3] 2019. **Rosario-Franco, M.**, Determining Stability Conditions for Submoons Orbiting Exomoon Candidate Kepler 1625b-I. 50th AAS Division of Dynamic Astronomy, Abstract id #303.09.
- [2] 2018. **Rosario-Franco, M.**, Beyond Exomoon Detection: The Future of Exolunar Science. UT System BD LSAMP BD Program, ACES Spacial Session Symposium.

- [1] 2017. **Rosario-Franco, M.**, Determining Stability Conditions for Submoons Orbiting Exomoon Candidate Kepler 1625b-I. 50th AAS Division of Dynamic Astronomy, Abstract id #303.09.

### Poster Presentations

- [8] 2020. **Rosario-Franco, M.**, Searching for Exomoons in Low Frequencies Using the Long Wavelength Array (LWA). 35th Annual New Mexico Symposium, Abstract #P18
- [7] 2019. **Rosario-Franco, M.**, Searching for Exo-lunar Radio Emissions in Nearby Stellar Systems. 6th Annual Science at Low Frequencies Conference (SALF), *Poster*.
- [6] 2018. **Rosario-Franco, M.**, Searching for the First Exomoon in the Radio: A Report on GMRT Data. 34th Annual New Mexico Symposium, Abstract #P7.
- [5] 2018. **Rosario-Franco, M.**, Searching for the First Exomoon in the Radio: A Report on GMRT Data. *Astrophysical Frontiers in the Next Decade and Beyond*, EXO P.13.
- [4] 2017. **Rosario-Franco, M.**, Searching for the First Exomoon in the Radio: A Report on GMRT Data. IX Women in Astronomy Meeting, P26.
- [3] 2014. **Rosario-Franco, M.**, vis.SME– Building a Visualization Tool to Analyze and Share Spectral Synthesis Stellar Characterization. 223rd American Astronomical Society (AAS) Meeting. Abstract id.347.36.
- [2] 2013. **Rosario-Franco, M.**, Triangulating on Stellar Ages: Calibrating Stellar Chronometry Using the Southern Open Cluster Collinder 135. 221st American Astronomical Society (AAS) Meeting. Abstract id.250.44.
- [1] 2012. **Rosario-Franco, M.**, Measurements of Separation and Position Angle of Binary Stars. 219th American Astronomical Society (AAS) Meeting.

### JOURNAL PUBLICATIONS

*Undergraduate students advised indicated by \**

- [14] **Rosario-Franco, M.** et. al, Secular Effects in Orbital Stability of Planets in Triple Stellar Systems *In prep*.
- [13] **Rosario-Franco, M.** et. al, Results for the First Campaign of Extra Solar Moons in Long Wavelengths *In prep*.
- [12] \*Boyle L., **Rosario-Franco, M.**, Musielak Z. On Hill Stability of Triple Stellar Systems with Exoplanets. *Astrophysics and Space Science Journal*. Under revision.
- [11] 2022. Satyal S., Quarles B., **Rosario-Franco, M.**, Moon-packing around an Earth-mass Planet *Monthly Notices of the Royal Astronomical Society*, Volume 516, Issue 1, pp.39-52 doi:[10.1093/mnras/stac2172](https://doi.org/10.1093/mnras/stac2172).
- [10] 2021. Quarles B., Eggl S. **Rosario-Franco, M.**, Exomoons in Systems with a Strong Perturber: Applications to  $\alpha$  Cen AB. *Astronomical Journal*, Issue 2, id.58. doi:[10.3847/1538-3881/ac042a](https://doi.org/10.3847/1538-3881/ac042a).
- [9] 2020. Quarles, B., Li G. **Rosario-Franco M.**, Application of Orbital Stability and Tidal Migration Constraints for Exomoons Candidates. *Astrophysical Journal Letters*, Volume 902, Issue 1, id. L20. doi:[10.3847/2041-8213/abba36](https://doi.org/10.3847/2041-8213/abba36).
- [8] 2020. **Rosario-Franco M.**, Quarles B., Musielak Z.E., Cuntz M., Orbital Stability of Exomoons and Submoons with Applications to Kepler 1625b-I. *Astronomical Journal*, Volume 159, Issue 6, id. 260 doi:[10.3847/1538-3881/ab89a7](https://doi.org/10.3847/1538-3881/ab89a7).
- [7] 2020. Scherr R., Lopez M., **Rosario-Franco M.**, Isolation and Connectedness Among Black and Latinx Physics Graduate Students. *Physical Review Physics Education Research*, Volume 16, Issue 2, id. 020132. doi:[10.1103/PhysRevPhysEducRes.16.020132](https://doi.org/10.1103/PhysRevPhysEducRes.16.020132).
- [6] 2020. Musielak Z.E., Davachi N., **Rosario-Franco M.**, Special Functions of Mathematical Physics: A Unified Lagrangian Formalism. *Mathematics*, doi:[10.3390/math8030379](https://doi.org/10.3390/math8030379).

- [5] 2020. Musielak Z.E., Davachi N., **Rosario-Franco M.**, Quarles B., Lagrangian formalism and Lie group approach for commutative semigroup of differential equations *Journal of Applied Mathematics*, 3170130 doi:10.1155/2020/3170130.
  - [4] 2017. Cotto D., et al. including **Rosario-Franco M.**, Report on the Observation of Binaries in 2013: Humacao University Observatory *Journal of Double Star Observations*, volume 13, no.3, p.373-375.
  - [3] 2017. Muller R.J., et al. including **Rosario-Franco M.**, Observation Report for the Year 2012: Humacao University Observatory *Journal of Double Star Observations*, volume 13, no.1, p.95-98.
  - [2] 2015. Muller R.J., et al. including **Rosario-Franco M.**, Observation Report for the Year 2011: Humacao University Observatory *Journal of Double Star Observations*, volume 11, no.4, p.411-417.
  - [1] 2012. Muller R.J., et al. including **Rosario-Franco M.**, Observation Report for the Year 2009, Humacao University Observatory *Journal of Double Star Observations*, volume 8, no.2, p.92-96.
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## SKILLS

### Languages:

- Fully bilingual, fluent in English and Spanish. Level 2 proficiency in ASL.

### Analog and Digital Electronics:

- Bipolar and FET implementations of continuous and switched amplifiers, modulators, converters, and filters.
- Design and testing tools such as Multisim and LabVIEW.

### Computer Programming:

- UNIX shell scripting.
- Data managing through SQL.
- Data managing, numerical analysis, and visualisation through Python.
- High performance computing through PBS/TORQUE.
- Astronomical N-BODY simulations using MERCURY and REBOUND.
- Radio Astronomy data reduction and calibration through AIPS and CASA.
- Photometric calibration through IRAF, DAOPHOT, CCD Soft and AIP4WIN.

### Instructional Design:

- Proficient with online platforms such as Canvas, Google Classroom.
- Ability to implement assessments with different tools and technologies, such as My Lab (Pearson), Clickers, and multimedia resources.
- Student Data management through Excel.