Raissa **ESTRELA**
B.sC. in Physics, M.sC.and Ph.D. in Science
and Geospace Applications
NASA Jet Propulsion Laboratory
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Curriculum Vitae

Languages

- Portuguese - Native / English - Fluent / French - Advanced

Appointments

10/2020-to present
NASA Postdoctoral Fellow at NASA Jet Propulsion Laboratory, Pasadena, USA.

Education

01/2017-12/2020
PhD in Science and Geospace Applications at Mackenzie Prebysterian University, FAPESP Fellowship, Sao Paulo, Brazil, with long-term internship at NASA Jet Propulsion Laboratory, JPL Graduate Fellowship, Pasadena, USA.

01/2015–01/2017
Master in Science and Geospace Applications at Mackenzie Prebysterian University, Capes Fellowship, Sao Paulo, Brazil.

01/2009-12/2014
B.Sc. in Physics at University Federal of Rio Grande do Norte, Natal, Brazil.

01/2013–12/2013
Undergraduate Exchange Period, Science Without Borders CNPq Fellowship, at University of Toronto, Toronto, Canada.

08/2007–12/2008
Interrupted Bachelor, Ecology, University Federal of Rio Grande do Norte, Natal, Brazil.

Projects

01/04/2017-31/03/2020
PhD Project "Influence of the atmosphere in the planetary habitability: analysis of its composition and protection to the impacts from stellar activity" , Mackenzie Prebysterian University, Sao Paulo, Brazil, under supervision of Prof. Dr. Adriana Benetti Marques Valio and Dr. Mark Swain.

01/2015–01/2017
Master Project "Stellar magnetic cycles in Kepler solar-type stars" , Mackenzie Prebysterian University, Sao Paulo, Brazil, under supervision of Prof. Dr. Adriana Benetti Marques Valio.

08/2014–12/2014
Final Undergraduate Project "Wavelet Technique applied to the study of rotation, activity and pulsation from Kepler Eclisping Binaries Light Curves" at Departament of Theorical and Experimental Physics, University Federal of Rio Grande do Norte, Natal, Brazil, under supervision of Prof. Dr. José Renan de Medeiros.

10/2013–09/2013
Summer Undergraduate Project "Investigation of galaxy clusters alignments in the Red Sequence Survey-2" at Departament of Astronomy and Astrophysics, University of Toronto, Toronto, Canada, under surpevision of Prof. Dr. Howard Yee.

03/2009–07/2014
Scientific Initiation Fellowship "Physical Properties of Extra-solar Planets" at Departament of Theorical and Experimental Physics, University Federal of Rio Grande do Norte, Natal, Brazil, under supervision of Prof. Dr. José Renan de Medeiros.

Complementary Education

15/09/2018-17/09/2020
JPL Graduate Program
Implementation in the Exoplanet Calibration Bayesian Unified Retrieval Pipeline (EXCALIBUR) of an automatic and uniform calibration of observations taken with the instrument STIS/Hubble Space Telescope, under supervision of Dr. Mark Swain

04/03/2018-21/04/2018
ESO Scientific Visitor Program
Reduction and analysis of exoplanet transmission spectra data taken with VLT/FORS2, under supervision of Dr. Elyar Sedaghati

01/2013–04/2013
Academic English, CNPq Fellowship, at School of Continuing Studies, University of Toronto, Toronto, Canada.

Fellowships and Grants

JPL Graduate Fellowship (2019-2020)

FAPESP BEPE grant (2018)

ESO Scientific Visitor Programme (2018)

IAU Astrobiology 2017 Grant (2017)

FAPESP (Sao Paulo State Research Foundation) PhD Fellowship 04/2017-04/2020

Swiss Government Excellence Scholarship (PhD) (2017) - refused

PhD Fellowship Max Planck Institute for Astronomy - Heidelberg (2017) - refused

HotMol School Scholarship (2017)

IAU Living Around Active Stars Grant (2016)

CAPES Fellowship (Master) - (01/01/2015-01/01/2017)

CNPq Scientific Initiation Fellowship - (2009-2013/2014)

Sao Paulo Advanced School of Astrobiology FAPESP Grant - (11-20/12/2011)

CNPq Fellowship Science Without Borders - University of Toronto - (2013)

Awards

2020 International Astronomical Union PhD at-large Prize in recognition for outstanding scientific achievement in astronomy: https://www.iau.org/news/announcements/detail/ann21034/

Best Poster Awards in the XLII Annual Meeting of the Brazilian Astronomical Society (1st place): "Detection of Earth-sized exoplanets atmospheres using ground-based telescopes.", **Estrela, R.**, Sedaghati, E., Melendez, J. and Valio, A. (2018)

Observing Proposals (accepted)

PI on Gemini's Fast Turnaround (FT) The first detection of a terrestrial exoplanet atmosphere around a bright K dwarf (ID: GS-2017B-FT-14)

PI on SOAR Telescope - Semester 2018A Unveiling the optical spectra of the Super-Earth GJ 1214b

Publications (First author: 4 total, +1 to be submitted)

- **Detection of aerosols at microbar pressures in an exoplanet atmosphere**
  Estrela, R., Swain, M. R., Roudier, G., West, R., Valio, A., accepted by AJ, (2021)

- **Disequilibrium chemistry in exoplanets atmospheres observed with the Hubble Space Telescope**
  Roudier, G., Swain, M; Gudipati, M., West, **R., Estrela** and Zellem, R., accepted by AJ (2021)

- **Characterization of an Instrument Model for Exoplanet Spectrum Estimation through Wide Scale Analysis on HST**
  Huber-Feely, N., Swain, M., Roudier, G. M., **Estrela, R.**, submitted to A&A (2021)

- **Detection of an Atmosphere on a Rocky Exoplanet**
  Swain, M. R., **Estrela, R.**, Roudier, G. M., Sotin, C., Rimmer, P., Valio, A., West, R., Pearson, K., Huber-Feely, N., Zellem, R., AJ, 161, 213 (2021) arXiv:2103.05657

- **The evolutionary track of the H/He envelope in the observed population of sub-Neptunes and super-Earths planets**
  Estrela, R., Swain, M., Gupta, A., Sotin, C., Valio, A; ApJ, 898, 104 (2020)

- **Surface and oceanic habitability in the Trappist-1 Planets under the impacts of flares**
  Estrela, R., Palit, S. and Valio, A.; Astrobiology, V. 20, Issue 12, p.1465-1475

- **The biological impact of superflares on planets in the Habitable Zone**
  Valio, A., **Estrela, R.**, Cabral, L., Grangeiro, A.; Proceedings of the International Astronomical Union, V. 345, pp. 176-180 (2020)

- **Characterization of stellar activity using transits and its impact on habitability**
  Estrela, R. and Valio, A.; to be published in the Proceedings of the International Astronomical Union, Solar and Stellar Magnetic Fields: origins and manifestations (2020)

- **Two Terrestrials Families with Different Origins**
  Swain, M., **Estrela, R.**, Sotin, C., et al.; ApJ, 881, 117 (2019)

- **Superflare UV flashes impact on Kepler-96 system: a glimpse of habitability when the ozone layer first formed on Earth**;
  Estrela, R. and Valio, A.; Astrobiology, 18, 1414-1424 (2018).

- **Using planetary transits to estimate magnetic cycles of Kepler stars**
  Estrela, R. and Valio, A.; Proceedings of the International Astronomical Union, V. 328, pp 152-158 (2017).

- **Activity and rotation of Kepler-17**
  Valio, A., **Estrela, R.**, Dirceu, Y., Bravo, J. P., and Medeiros, J. R.; ApJ v.835, 294V (2017)

- **Stellar magnetic cyles in Kepler-17 and Kepler-63**
  Estrela, R. and Valio, A.; ApJ v.831 57E (2016)

- **Wavelets: a powerful tool for studying rotation, activity, and pulsation in Kepler and CoRoT stellar light curves**
  Bravo, J. P., Roque, S., **Estrela, R.**, Leão, I. C., Medeiros, J. R.; A&A V.568 A34 (2014)

Book Chapter

"Superflares UV impact on the habitability of exoplanets" to be publish in the book *UV Astronomy and the investigation of the origin of life* by Elsevier (2021).

Invited talk

- **Characterization of stellar activity using transits and its impact on habitability**
  at IAU Symposium 354 Solar and Stellar Magnetic Fields: Origins and Manifestations,Copiapo, Chile, 06/07/2019.
- **Detection of an atmosphere on the Rocky Exoplanet GJ 1132b**
  at Exoplanet Centre Seminars at the University of Cambridge, to be presented at 06/15/2021.
- **Detection of an atmosphere on the Rocky Exoplanet GJ 1132b**
  at MPIA (Heidelberg) Exocoffee, to be presented at 04/30/2021.

Contributed talks

- **Diversity in Terrestrial worlds: analysis of multi dimensional factors that shape their evolution.**
  at Habitable Worlds 2021 (Virtual), 02/23/2021.
- **Atmospheric Evolution of Super-Earths and sub-Neptunes**
  at Precision Spectroscopy 2021 (Virtual), 02/01/2021.
- **The evolutionary track of the H/He envelope in the observed population of sub-Neptunes and super-Earths planets**
  at Exoplanet Science Initiative Symposium (Virtual), 08/31/2020.
- **The evolutionary track of the H/He envelope in the observed population of sub-Neptunes and super-Earths planets**
  at Virtual 236th Annual Meeting of the American Astronomical Society, 02/06/2020.
- **Two Terrestrials Families with Different Origins**
  at Exoplanet Science Initiative Symposium, Caltech, Pasadena, USA, 26/03/2019.
- **Modeling instrumental systematics in transmission spectra from FORS2 using Gaussian Processes**
  at 42nd COSPAR Assembly, Pasadena, USA, 15/07/2018.
- **Exploring habitability under an environment of strong superflares at a time when the ozone layer first formed on Earth**
  at 42nd COSPAR Assembly, Pasadena, USA, 18/07/2018.
- **Characterizing the exoplanets atmospheres using ground based telescopes**
  at ESO Coloquium, Santiago, Chile, 19/04/2018.
- **The Biological Impact of Kepler-96 Superflares on its Planetary System**
  at XLI Brazilian Astronomical Society Annual Meeting, Sao Paulo, Brazil, 05/09/2017.

- **Kepler-96 system: exploring the habitability of its super-Earth and of a hypothetical Earth in an environment of strong superflares**
  at Precision Spectroscopy: Towards Earth 2.0, Sao Paulo, Brazil, 04/08/2017.

- **Kepler-96 flares and their impact on the transiting planet**
  at AASTCS 5: Radio Exploration of Planetary Habitability, Palm Springs, California, USA, 12/05/2017.

- **Using planetary transits to estimate magnetic cycles of Kepler stars**
  at IAU Symposium 328 (Living Around Active Stars), Maresias, Sao Paulo, Brazil, 17/10/2016.

- **Stellar magnetic cycles in the solar-like stars Kepler-17 and Kepler-63**
  at XL Brazilian Astronomical Society Annual Meeting, Ribeirao Preto, Sao Paulo, Brazil, 29/08/2016.

- **Characterization and Interaction of the magnetic field in solar type stars and their planets**
  at Exoplanetary Atmospheres and Habitability Workshop, Observatoire de la Côte d'Azur, Nice, France, 12/10/2015

- **Investigation of galaxy clusters alignments in the Red Sequence Survey-2**
  at Summer Undergraduate Research Program, University of Toronto, Toronto, Canada, 20/08/2013

Posters

- **The evolutionary track of the H/He envelope in the observed population of sub-Neptunes and super-Earths planets**
  ESTRELA, Raissa, SWAIN, Mark, GUPTA, Akash, SOTIN, Christophe, VALIO, Adriana. 2020, 235th Annual Meeting of the American Astronomical Society, Honolulu, Hawai, USA.

- **Unveiling hazes and energy balance in the exoplanets atmospheres with STIS.**
  ESTRELA, Raissa, SWAIN, Mark and ROUDIER, Gael. 2019, Extreme Solar Systems IV, Reykjavik, Iceland.

- **Two terretrials families with different origins**
  ESTRELA, Raissa, SWAIN, Mark, SOTIN, Christope, ROUDIER, Gael and ZELLEM, Robert. 2019, Sagan Workshop, Caltech, Pasadena, USA.
  and at Kepler and K2 Science Conference V, Glendale.

- **Detection of Earth-sized exoplanets atmospheres using ground-based telescopes.**
  ESTRELA, Raissa, SEDAGHATI, Elyar, MELENDEZ, Jorge and VALIO, Adriana. 2018, XLII Brazilian Astronomical Society Annual Meeting, Sao Paulo, Brazil

- **Superflares impact on Kepler-96 system: exploring habitability when the ozone layer first formed on Earth**
  ESTRELA, Raissa and VALIO, Adriana. Astrobiology 2017, Coyhaique, Chile, 2017.

- **Characterization of the magnetic field in Kepler-17 and Kepler-63**
  ESTRELA, Raissa and VALIO, Adriana. XXXIX Brazilian Astronomical Society Annual Meeting, Ouro Preto, Minas Gerais, Brazil, 2015.

- **Identification of rotation and pulsation signatures in Kepler lightcurves using Wavelet technique**
  ESTRELA, Raissa and VALIO, Adriana. XXXIX Brazilian Astronomical Society Annual Meeting, Ouro Preto, Minas Gerais, Brazil, 2015.

- **Wavelet procedure applied to Kepler light curve of planet host stars and eclipsing binqaries**
  ESTRELA, R., LIRA, S. R. ; BRAVO, J. P. ; FREITAS, D. B. ; MEDEIROS, J. R. XXXVII Brazilian Astronomical Society Annual Meeting, Águas de Lindóia, Sao Paulo, Brazil, 2012.

- **Wavelet characterization of the CoRoT Lightcurves**
  ESTRELA, R., LOPES, C. E. F. ; MEDEIROS, J. R. XXXVI Brazilian Astronomical Society Annual Meeting, São Paulo, Brazil, 2011.

- **The magic diversity of the Zoo CoRoT**
  ESTRELA, R., LOPES, C. E. F. ; MEDEIROS, J. R. XXXV Brazilian Astronomical Society Annual Meeting, Passa Quatro, Brazil, 2010.

Teaching Experience

Short-term course offered to the Academic Week of Biological Sciences 2017 at Mackenzie Presbyterian University:

Astrobiology: Life Beyond Earth

- Search for life in our solar system: the perspectives to find life in other planets or moons in our solar system and what are the conditions to have habitability
- Search for life beyond our solar system: how to detect exoplanets orbiting distant stars and how to search for biological signals in them
- Planetary habitability: the study of all physical phenomena that can impact or have influence in the development of life

Advising Experience

- 06/2020-to present
  Advising Ashini Modi, Junior student at Caddo Parish High School (Shreveport, Louisiana)
  Project: Atmospheric mass loss in Terrestrial Exoplanets induced by Stellar Wind

- 03/2018-08/2018
  Co-advised Abel Granjeiro, undergraduate student in Chemistry at Mackenzie Presbyterian University (Sao Paulo, Brazil)
  Project: Atmosphere and Habitability of Exoplanets

- 06/2018- 08/2018
  Co-advised Luisa Cabral, undergraduate student in Biological Sciences at Mackenzie Presbyterian University (Sao Paulo, Brazil)
  Project: Effects of Trappist-1 Superflares on Life

Computer Skills

- Programming
  Python, IDL

- Operating System
  Linux, mac IOS

Public Outreach

- Contributor in the blog Astropontos since 2017 (https://astropontos.org/ - portuguese version of astrobites)

Event planning

- **Galileu's Atelier**

  XV Week for Science, Tecnology and Culture - CIENTEC, University Federal of Rio Grande do Norte, Natal, Brasil

- **Workshop**

  SOC at the Precision Spectroscopy Workshop: From the first stars to Exoplanets , 10-11 September 2018, Sao Paulo, Brazil.

  LOC at the Precision Spectroscopy Workshop: Stellar connections: from Galaxy evolution to exoplanets, 1-3 February 2021, Sao Paulo, Brazil.

  Coloquiums of the Center for Radioastronomy and Astrophysics Mackenzie

- **Journal Clubs**

  Sprint 2: interior-atmosphere-magnetosphere-stellar wind connections at the JPL ESI Journal Club

  Journal Club of the Science and Geospace Applications Graduated Program (2016-2018)

Press

- **Interviews (English):**

  Hubble Media (Press Release) - Detection of an atmosphere on GJ 1132b:

  Astronomy Magazine - Volcanoes could have breathed new life into a super-Earth's atmosphere

  WIRED Magazine - Did This Scorching-Hot Planet Lose—and Regain—an Atmosphere?

- **Interviews (Portuguese):**

  Mackenzie Presbyterian University - Doctoral thesis of student from Mackenzie Presbyterian University wins award from the International Astronomical Union

  Canaltech - Hubble observes exoplanet that formed a secondary atmosphere

  Tilt UOL - Brazilians scientists participated in the discovery of a recicled atmosphere on an exoplanet

  Space Today - Hubble Detects Exoplanet that Changed Atmosphere (youtube channel)

  Mensageiro Sideral - The week in the Solar System # 37 (youtube channel)

  Globo TV - Scientist from Paraíba (Brazil) is part of the team that discovered an atmosphere that is being regenerated

  Folha de Sao Paulo - Study with a star similar to the Sun helps to understand the evolution of life on Earth

  G1 Globo - Student from Paraíba (Brazil) will study planets outside of the Solar System at NASA

  Moderna Parahyba (blog): - Raissa Estrela: the interstellar scientist from Paraíba, Brazil

  Globo TV - At the forefront of science, Chile hosts two of the biggest astronomy observatories

  Radio CBN - Career in Science/Astronomy

  Live on Instagram with high school radio "Nas Ondas do Daura" about the career in science and exoplanets atmospheres