

# Lilianne Nakazono

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Languages	Portuguese (native), English (fluent), Spanish (Intermediate), Japanese (Intermediate)

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## RESEARCH INTERESTS

- Stellar and Extragalactic Astrophysics, High-redshift Universe
- Machine Learning, Data Science, Big Data
- Astrostatistics
- Large-area sky surveys

## EDUCATION

<b>Doctorate in Astronomy</b>	2018 - present
Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo São Paulo, Brazil	
<b>Bachelor in Astronomy</b>	2014 - 2016
Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo São Paulo, Brazil	
<b>Bachelor in Statistics</b>	2010 - 2013
Instituto de Matemática e Estatística, Universidade de São Paulo São Paulo, Brazil	

## RESEARCH EXPERIENCE

<b>Doctorate program in Astronomy</b>	2018
Thesis: "Classification and redshift estimation of new quasars in photometric surveys, using S-PLUS as study case"; Advisor: Prof. Claudia Mendes de Oliveira (IAG-USP)	
Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo São Paulo, Brazil	

Our object classifier is one of the pillars of the S-PLUS data releases, being the primary source of separation between stars, quasars and galaxies. This project has leveraged my knowledge in machine learning and software engineering for astronomy, as well as in querying, cross-matching and/or analyzing data from all major astronomical surveys, having a huge impact in the new era of JWST, LSST, and Euclid. I also worked in obtaining photometric redshifts for quasar candidates and I've been leading the search for anomalous quasars.

## Exchange program at the University of Washington (12 months)

2022

Advisor: Prof. Željko Ivezić (UW)

During my internship at DiRAC/UW, I started working with the identification of C-rich and O-rich AGB stars in S-PLUS to study their distribution in the Milky Way, while also writing a paper on quasar photometric redshifts. At this point, we have developed a giant/dwarf classification for S-PLUS.

## Exchange program at the University of Florida (4 months)

2017 / 2018

Advisors: Prof. Stephen Eikenberry (UF), Prof. Anthony Gonzalez (UF)

During my internship at UF, I started working with quasar/star separation for S-PLUS using color-color diagrams

## Awarded time as Principal Investigator

2018

8 hours with Goodman spectrograph to observe quasar candidates, SOAR telescope  
20 hours with GMOS-S spectrograph to observe quasar candidates, GEMINI-South telescope

# LEADERSHIP EXPERIENCES

## Supervision and co-supervision

- Raquel Ruiz, Astronomy 1st-year graduate student** 2020 - present  
 Project: Estimation of quasar photo-zs in S-PLUS using Bayesian Neural Networks PIBITI (2020-2021) and FAPESP scholarship (2021 - present)  
 Contributed talks: IAU Symposium 368 (2022) and XLV Annual Meeting of Sociedade Astronômica Brasileira (2022)
- Gabriel Jacob Perin, Computer Science undergraduate student** (co-supervision) 2022 - present  
 Project: Classification of stars, quasar, and galaxies with self-supervised learning approach using S-PLUS images (FAPESP scholarship)  
 In collaboration with Prof. Nina Hirata (Department of Computer Science, IME-USP)
- Gabriela Soares, Statistics undergraduate student** (co-supervision) 2022  
 Project: Estimation of quasar photo-zs in S-PLUS using FlexCoDE  
 In collaboration with Prof. Rafael Izbicki (Department of Statistics, UFScar)

## Organizations

- Vice-Director of Research & Development at Turing USP** 2023 - present
- Director of Research & Development at Turing USP** 2022 - 2023  
 Turing USP has 60+ members with different backgrounds from Universidade de São Paulo. Our goal is to disseminate, study, develop and apply Machine Learning ([GitHub Organization](#)). My role as head of R&D was to bring innovation into our projects and to implement better workflows while guaranteeing that our members are improving their hard and soft skills.

## PRESENTATIONS

### Invited talks

<b>The search for quasars within the Southern Photometric Local Universe Survey (S-PLUS)</b> Colloquium at the Department of Astronomy, IAG-USP São Paulo, Brazil	2023
<b>Panel discussion: Practical Problem Solving — including Interpretability</b> IAU Symposium 368 "Machine Learning in Astronomy: Possibilities and Pitfalls" XXXIst IAU General Assembly Busan, Rep. of South Korea	2022
<b>Lecturer on the topic of Machine Learning in Astronomy</b> ( <a href="#">GitHub repository</a> ) IX La Plata International School on Astronomy and Geophysics La Plata, Argentina	2020

### Contributed talks

<b>Stellar classification and the search for C-rich and O-rich AGB stars</b> 18th S-PLUS Collaboration Meeting Observatório Nacional, Rio de Janeiro, Brazil	2023
<b>Redshift estimation of quasars using 12-band photometry from S-PLUS</b> 241st annual meeting of the American Astronomical Society Seattle, Washington, United States of America	2022
<b>Assessing the impact of narrow-band information in photometric surveys</b> iid2022: Statistical Methods for Event Data Illuminating the Dynamic Universe Guntersville, Alabama, United States of America	2022
<b>VAC: Classification of stars, quasars, and galaxies for S-PLUS DR2 and iDR3</b> 15th S-PLUS Collaboration Meeting Online	2021
<b>How narrow-band surveys can provide a better quasar selection?</b> Quasars During Reionisation (SAZERAC) Online	2020
<b>New version of the star/quasar/galaxy classification</b> 13th S-PLUS Collaboration Meeting Online	2020
<b>Search for QSOs: updates</b> 11th S-PLUS Collaboration Meeting IAG-USP, São Paulo, Brazil	2019
<b>Classification and photo-zs of quasars using machine learning in photometric observations from S-PLUS</b> XLIII annual meeting of Sociedade Astronômica Brasileira Universidade de São Paulo, São Paulo, Brazil	2018
<b>Separation of stars and quasars in multispectral images</b> II J-PAS and S-PLUS Brazilian Meeting IAG-USP, São Paulo, Brazil	2015

### Poster and attendances

- COIN Residence Program #7, Lisbon, Portugal, 2023
- 9th-16th S-PLUS Collaboration Meeting, 2018-present

- AstroHackWeek2022, Max Planck Institute for Astronomy, Heidelberg, Germany, 2022
- 16th S-PLUS Meeting, "**Identification of C-rich and O-rich AGB stars**", Ubatuba, Brazil, 2021
- IAUS 359: Galaxy Evolution and Feedback Across Different Environments, "**Classification and redshift estimation of quasars in photometric surveys**", Bento Gonçalves, Rio Grande do Sul, Brazil, 2020
- PAPIs LATAM: Real-World Machine Learning Stories, 2019
- FIRST LIGHT Advanced School, IAG-USP, São Paulo, Brazil, 2019
- SPANet Workshop on Clusters of Galaxies and the Large-Scale Structure of the Universe, 2018
- AstroHackWeek2018, Lorentz Center, Leiden, The Netherlands, 2018
- XLII annual meeting of Sociedade Astronômica Brasileira, "**Search for new bright quasars with S-PLUS**", 2018
- Machine Learning workshop in R, XII aMostra de Estatística, IME-USP, 2017
- XLI annual meeting of Sociedade Astronômica Brasileira, "**Separation of stars and quasars in multispectral images of J-PAS, J-PLUS, S-PLUS and ALHAMBRA**", 2017
- I Python BootCamp, IAG-USP, São Paulo, Brazil, 2015

## TEACHING EXPERIENCE

- TA for the "Astronomical databases and Astrostatistics in the Big Data era" undergraduate/graduate course, 2021  
Roles: conducted hands-on activities, created slack channel, wrote instructions to install all needed softwares in Linux/Windows/MacOS, helped with questions from students on slack, reviewed jupyter notebooks
- TA for the "Numerical methods in Astronomy" undergraduate course, 2016  
Roles: evaluated student's activities
- TA for the "Introduction to Probability and Statistics II" undergraduate course, 2011  
Roles: evaluated student's activities
- Machine learning lecture/hands-on for graduate and undergraduate students at IAG-USP, 2017-2018
- Machine learning lecture/hands-on for graduate students at University of Florida, 2017 ([GitHub repository](#))

## AWARDS, SCHOLARSHIPS AND GRANTS

- IAU grant to attend IAUS 368 at the General Assembly in South Korea, 2022
- FAPESP (funding agency from the state of Sao Paulo) grant for research abroad at University of Washington, US, 2022
- Grant from the organization to attend AstroHackWeek, 2022
- Certificate of excellence in the "Observational Astrophysics" graduate course, 2018
- FAPESP scholarship for the Doctorate program, 2019
- IAU Grant to attend IAUS 359, 2020
- Grant from the organization to attend AstroHackWeek, 2018
- CAPES (federal funding agency) scholarship for M.Sc. program, 2018
- Prize of Excellence at Asia Supercomputer Community, 2016
- Best undergraduate research of the Astronomy Department (IAG-USP), 2015
- FAPESP scholarship for Research Experience for Undergraduates, 2014-2016

## OUTREACH, SERVICE & OTHERS

- Discord's admin for the S-PLUS collaboration (including coordinating the migration from Slack to Discord), 2023 - present
- Volunteer staff at the 241st annual meeting of the American Astronomical Society, Seattle, 2023
- Refereed for Astrophysics and Space Science journal, 2022
- Web designer and administrator of the S-PLUS collaboration's website, 2020 - present

- Participated in the project ASTROMINAS, where I followed up groups of secondary-school students identified as a woman (40 hours), 2020
- Created and maintained the Slack workspace for the S-PLUS collaboration, 2019 - 2023
- Coordinator of the development group for the S-PLUS logo and visual identity, 2021-2022
- Volunteer staff at IAUS 359: Galaxy Evolution and Feedback Across Different Environments, 2020
- LOC of FIRST LIGHT Advanced School, 2019
- Instructor of "Introduction to Machine Learning" workshop for PyLadiesSP (4-hours duration); Innovation Congress at FEI (1-hour); Universidade Estadual de Londrina (1-hour), 2019-2020 ([GitHub Repository](#))
- Visitor guide at Observatório Abração de Moraes (OAM-USP), 2019

## PROGRAMMING & SKILLS

- Major contributions to the splusdata package (Python)
- Python, R, SQL, ADQL, Fortran 95, C, Julia
- TOPCAT, STILTS, IRAF, Aladin, DS9

## PRESS & INTERVIEWS

- [EN] [Funding crisis at Brazilian science agency could leave 80,000 researchers and students without pay](#), Science.org
- [PT-BR] [Astrônomos descobrem estrela que desafia modelos atuais de evolução do Universo](#), Jornal da USP

## PUBLICATIONS

### Major-contributed (refereed)

- **Nakazono, L.**, et al., "On the discovery of stars, quasars, and galaxies in the Southern Hemisphere with S-PLUS DR2", Monthly Notices of the Royal Astronomical Society, vol. 507, no. 4, pp. 5847–5868, 2021.
- Almeida-Fernandes, F., SamPedro, L., Herpich, F. R., Molino, A., Barbosa, C. E., Buzzo, M. L., Overzier, R. A., de Lima, E. V. R., **Nakazono, L.**, et al., "Data Release 2 of S-PLUS: Accurate template-fitting based photometry covering 1000 deg<sup>2</sup> in 12 optical filters", Monthly Notices of the Royal Astronomical Society, vol. 511, no. 3, pp. 4590–4618, 2022.
- Lima, E. V. R., Sodré Jr, L., Bom, C.R., Teixeira, G.S.M., **Nakazono, L.**, et al., "Photometric redshifts for the S-PLUS Survey: Is machine learning up to the task?", Astronomy and Computing, vol. 38, 2022.
- Mendes de Oliveira, C., Ribeiro, T., Schoenell, W., Kanaan, A., Overzier, R. A., Molino, A., Sampedro, L., ..., **Nakazono, L.**, et al., "The Southern Photometric Local Universe Survey (S-PLUS): improved SEDs, morphologies, and redshifts with 12 optical filters", Monthly Notices of the Royal Astronomical Society, Volume 489, Issue 1, October 2019, Pages 241–267.

### Minor-contributed (refereed)

- Werner, S., ..., **Nakazono, L.**, et al., "S-PLUS DR1 galaxy clusters and groups catalogue using PzWav", submitted to Monthly Notices of the Royal Astronomical Society.
- Jeram, S., ..., **Nakazono, L.**, et al., "An Extremely Bright QSO at  $z = 2.89$ ", The Astrophysical Journal, vol. 899, no. 1, 2020.

- Molino, A., ..., **Nakazono, L.**, et al., "Assessing the photometric redshift precision of the S-PLUS survey: the Stripe-82 as a test-case", Monthly Notices of the Royal Astronomical Society, Volume 499, Issue 3, December 2020, Pages 3884–3908.

## Non-refereed

- Cabrera, C., Hong, S., **Nakazono, L.**, Parkinson, D., Ting, Y., "Sungwook E. (in alphabetical order) "Panel Discussion: Practical Problem Solving for Machine Learning", proceedings of the International Astronomical Union Symposium 368 "Machine Learning in Astronomy: Possibilities and Pitfalls"
- Eikenberry, S., ..., **Nakazono, L.**, et al., "Astro2020: Decadal Survey on Astronomy and Astrophysics", APC white papers, no. 137; Bulletin of the American Astronomical Society, Vol. 51, Issue 7, id. 137, 2019.