

Paula Sánchez Sáez

Postdoctoral Fellow

European Southern Observatory (ESO)

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EDUCATION

PhD in ASTRONOMY, **Universidad de Chile**, Santiago, Chile 2013 - 2019

Thesis: "AGN variability in the era of Big Data" | Advisor: Paulina Lira.

Bachelor's Degree in ASTRONOMY, **Universidad de Chile**, Santiago, Chile January 2013

Graduated with Highest Honors.

SKILLS

Languages: SPANISH: Mothertongue, ENGLISH: Fluent, GERMAN: Basic.

Computing: Advanced: Python (e.g., Pandas, Scikit-learn, Imbalanced-learn, Keras, TensorFlow).
Intermediate: SExtractor, GitHub, PostgreSQL, LINUX, MAC OS, LATEX, Topcat.
Basic: C, Java, Matlab, R, IRAF, MIDAS, Excel.

Astronomy: Development of reduction and calibration pipelines for the processing of astronomical images, statistical analysis, time series analysis, machine learning classification, spectral analysis, experience observing with optical ground-based telescopes, experience working on survey observational strategy optimization.

RESEARCH EXPERIENCE

European Southern Observatory (ESO), Garching, Germany November 2021 - present

ESO Fellow

75% independent research, 25% functional work.

Working on Machine Learning studies for the identification of Changing-look AGNs and low-mass AGNs.

Millennium Institute of Astrophysics (MAS), Macul, Chile April 2020 - October 2021

Pontificia Universidad Católica de Chile (PUC)

FONDECYT fellow

Working on AGN variability studies in the context of the **ALeRCE** project.

Inria Chile, Las Condes, Chile December 2020 - August 2021

Postdoctoral Researcher

Working on Deep Learning studies for the **ALeRCE** project.

Millennium Institute of Astrophysics (MAS), Macul, Chile May 2019 - April 2020

Pontificia Universidad Católica de Chile (PUC)

Universidad Adolfo Ibáñez (UAI)

Postdoctoral Researcher

Working on Machine Learning classification of variable and transient objects for the **ALeRCE** project.

European Southern Observatory (ESO), Vitacura, Chile April 2018 - March 2019

ESO Studentship Programme Chile

Working with Konrad Tristram on dust reverberation

mapping of AGNs.

Kavli Institute for Astronomy and Astrophysics (KIAA), Beijing, China March 2017 - June 2017
Visiting student
Working with Luis Ho on spectral analysis of variable AGNs.

Penn State University (PSU), State College, USA January - February 2017
Visiting student
Working with Niel Brandt on the classification of AGNs using Machine Learning.

GRANTS AND HONORS

- ESO Garching Fellowship 2021-2024
 - Fondecyt Postdoctorado 2020 2020-2023
 - **L'Oréal-UNESCO-CHILE For Women in Science Award** 2016
- 2 annual fellowships, 7.000.000 CLP or 9.030,00 € for each one.
- Funding for projects of graduate students, Universidad de Chile. 2015, 2016
 - Conicyt Scholarship, Doctorado Nacional. 2013 - 2017
 - Outstanding Student, FCFM, Universidad de Chile. 2008, 2009, 2011

TALKS AT INTERNATIONAL CONFERENCES (SELECTED)

- Origin, growth and feedback of black holes in dwarf galaxies, San Sebastian, Spain September 2022
- Bayesian Deep Learning for Cosmology and Time Domain astrophysics, Paris, France June 2022
- Machine Learning for Astrophysics - ML4Astro, Catania, Italy May 2022
- SciOps 2022: Artificial Intelligence for Science and Operations in Astronomy, Garching, Germany May 2022
- **Invited talk:** Low-latency alerts & Data analysis for MMA, virtual meeting January 2022
- **Invited talk:** Machine Learning in Astronomy, from classical to physics-informed, virtual meeting July 2021
- Supermassive Black Hole Studies with the Legacy Survey of Space and Time, virtual meeting July 2021
- EAS Annual Meeting 2021, virtual meeting June 2021
- **Invited talk:** Supermassive Black Hole Studies with LSST, part of 236th AAS meeting June 2020
- **Invited talk:** XVI Latin American Regional IAU Meeting (LARIM), Antofagasta, Chile November 2019
- Quasars in Crisis 2019, Edinburgh, Scotland August 2019
- TORUS 2018: The many faces of the AGN obscuration, Puerto Varas, Chile December 2018
- Massive black holes in evolving galaxies, Paris, France June 2018
- LSST AGN Science Collaboration Meeting, Grapevine, TX, USA January 2017
- Hidden Monsters Hanover, NH, USA August 2016
- AGN: what's in a name, Garching, Germany June 2016

SEMINARS

- ESO AI Forum: Tutorial Deep Learning (CNNs and RNNs) April 2022
- Yale Data Science x Astronomy-Astrophysics November 2021
- SWIFAR in Yunnan university, virtual talk May 2021
- Uppsala University, virtual talk April 2021
- Universidad de Valparaiso, Valparaiso, Chile October 2020
- Caltech, ZTF Machine Learning group, Pasadena, USA August 2020
- LSST AGN science collaboration August 2020
- University of Southampton, Southampton, England August 2019
- Deutsches Elektronen-Synchrotron (DESY), Berlin, Germany November 2018
- Universidad de Valparaiso, Valparaiso, Chile October 2018
- European Southern Observatory (ESO), Vitacura, Chile September 2018

- Association of Universities for Research in Astronomy (AURA), La Serena, Chile September 2018

ACCEPTED OBSERVING PROPOSALS AS PI

- VLT/X-SHOOTER (1.3 hours): “Is ZTF19acnsky a newborn AGN or a long lived TDE?”, DDT, July 2022
- LCO 1M (47 hrs): “Improving Target and Observation Manager (TOM) Synergies with Community Brokers”, TOM Development Program 2020A, 2020B.
- SOAR/Goodman (3 nights): “Spectroscopic follow up of AGN candidates from The QUEST-La Silla AGN Variability Survey”, CNTAC 2016B.
- SOAR/Goodman (3 nights): “Spectroscopic follow up of AGN candidates from The QUEST-La Silla AGN Variability Survey”, CNTAC 2017A.
- NTT/EFOCS2 (4 nights): “Spectroscopic follow up of AGN candidates from The QUEST-La Silla AGN Variability Survey”, ESO 101.A.

TEACHING AND OUTREACH EXPERIENCE

La Serena School for Data Science 2022 Lecturer: Deep Learning Project supervisor.	August 2022
ESO Summer Resaerch Programme Supervision of one undergraduate student.	July - August 2022
ESO Summer Resaerch Programme Lecture: Using Deep Learning to foster astronomical discoveries.	July 2022
La Serena School for Data Science 2021 Lecturer: Deep Learning Project supervisor.	August 2021
Co-Supervision of one Master Student, and four Undergraduate Students	2016 - 2020
Universidad de los Andes Lecturer: Introduccion a la Astronomía	2020 - 2021
Center for the Study and Development of Talent (PENTA-UC) Lecturer: Intergalactic Journey (2 semesters, for talented high school students)	2017 - 2018
FCFM, Universidad de Chile Teaching Assistant: Introduction to Physics (3 semesters), Calculus of Several Variables (1 semester), Intergalactic Medium (1 semester), Planetary Science (1 semester), Radiative Processes (1 semester), EdV Planetary Science (2 semesters), EdV Astronomy (1 semester).	2010-2016
Universidad Andres Bello Teaching Assistant: Introduction to Physics (3 semesters).	2011-2012
Outreach activities in different contexts: Organization of the ESO-Vitacura Girls’ Day. Participant in Cazadoras de estrellas. Participant in Día de la astronomía en Chile. Member of the “Observatorio Astronómico Nacional” (Chile) outreach group.	2013 - 2019

ADDITIONAL PROFESSIONAL EXPERIENCE

ESO Duties: support for the 4MOST infrastructure working group 2 (IWG2)
 Member of the 4MOST Chilean AGN/Galaxy Evolution Survey (ChANGES)
 Member of the ALeRCE broker
 Member of the LSST AGN Science Collaboration
 Co-organizer of the AI Forum at ESO

Member of the ESO Fellowship Selection Committee Europe (FSCE) 2022
Fellows Representative at ESO Garching

Peer Review: referee for Monthly Notices of the Royal Astronomical Society (MNRAS), Astronomy & Astrophysics (A&A), and the Astrophysical Journal (ApJ)

Participant in Astroinformatics and Astrostatistics schools:

- Target and Observation Manager (TOM) Toolkit Workshop September-October 2019
- XXX Canary Islands Winter School of Astrophysics: "Big Data Analysis in Astronomy" November 2018
- 11th Heidelberg Summer School: "Astrostatistics and Data Mining" September 2016
- La Serena School for Data Science: "Applied Tools for Data-driven Sciences" August 2014

LOC/SOC member:

- LSST Enabling Science 2020 broker workshop October 2020
- The ALeRCE broker tutorial September 2020
- ALeRCE Hackathon January 2020
- TORUS2018 workshop. December 2018
- 2do Workshop de estudiantes de Astronomía de la Universidad de Chile March 2017
- 1er Workshop de estudiantes de Astronomía de la Universidad de Chile May 2016

Graduate Student Representative, Astronomy Department, Universidad de Chile 2014 - 2016

List of Publications

PEER-REVIEWED PUBLICATIONS AS FIRST AUTHOR

- **P. Sánchez-Sáez**, H. Lira, L. Martí, N. Sánchez-Pi, J. Arredondo, F. E. Bauer, A. Bayo, et al., 2021, the *Astronomical Journal*, 162, 206. “Searching for Changing-state AGNs in Massive Data Sets. I. Applying Deep Learning and Anomaly-detection Techniques to Find AGNs with Anomalous Variability Behaviors”.
- **P. Sánchez-Sáez**, I. Reyes, C. Valenzuela, F. Förster, S. Eyheramendy, F. Elorrieta, et al. 2021, *Astronomical Journal*, 161, 141. “Alert Classification for the ALERCE Broker System: The Light Curve Classifier”.
- **P. Sánchez-Sáez**, P. Lira, R. Cartier, N. Miranda, L. C. Ho, P. Arévalo, F. E. Bauer, P. Coppi, and C. Yovaniniz, 2019, *Astrophysical Journal Supplement Series*, 242, 10. “The QUEST-La Silla AGN Variability Survey: selection of AGN candidates through optical variability”.
- **P. Sánchez-Sáez**, P. Lira, J. Mejía-Restrepo, L. C. Ho, P. Arévalo, M. Kim, R. Cartier, P. Coppi, 2018, *Astrophysical Journal*, 864, 87. “The QUEST-La Silla AGN variability survey: connection between AGN variability and black hole physical properties”.
- **Sánchez, P.**, Lira, P., Cartier, R., Pérez, V., Miranda, N., Yovaniniz, C., Arévalo, P., Milvang-Jensen, B., Fynbo, J., Dunlop, J., Coppi, P., Marchesi, S., 2017, *Astrophysical Journal*, 849, 110. “Near-infrared variability of obscured and unobscured X-ray-selected AGNs in the COSMOS field”.

PEER-REVIEWED PUBLICATIONS AS CO-AUTHOR

- López-Navas E., Arévalo, P., Bernal, S., Graham, Matthew J., Hernández-García, L., Lira, P., **Sánchez-Sáez P.**, 2022, *Monthly Notices of the Royal Astronomical Society*, accepted for publication. “The Type 1 and Type 2 AGN dichotomy according to their ZTF optical variability”.
- F. Förster, A. M. Muñoz Arancibia, I. Reyes-Jainaga, A. Gagliano, D. Britt, S. Cuellar-Carrillo, F. Figueroa-Tapia, A. Polzin¹, Y. Yousef, J. Arredondo et al. (including **P. Sánchez-Sáez**), 2022, the *Astronomical Journal*, 164, 195. “DELIGHT: Deep Learning Identification of Galaxy Hosts of Transients using Multiresolution Images”.
- A. B. Kovacevic, V. Radovic, D. Ilic, L.C. Popovic, R. J. Assef, **P. Sánchez-Sáez**, R. Nikutta, C. M. Raiteri, et al., 2022, *The Astrophysical Journal Supplement Series*, 262, 49. “The LSST Era of Supermassive Black Hole Accretion Disk Reverberation Mapping”.
- D. De Cicco, F. E. Bauer¹, M. Paolillo, **P. Sánchez-Sáez**, W. N. Brandt, F. Vagnetti, G. Pignata, M. Radovich, and M. Vaccari, 2022, *Astronomy & Astrophysics*, 664, 117. “A structure function analysis of VST-COSMOS AGN”.
- Jankov, I.; Kovacevic, A. B.; Ilic, D.; Popovic, Luka C. ; Radovic, V.; Cvorovic-Hajdinjak, I.; Nikutta, R.; and **Sánchez-Sáez, P.**, 2022. *Astronomische Nachrichten*, 343, e210090. “Photoreverberation mapping of quasars in the context of Legacy Survey of Space and Time observing strategies”.
- Cvorovic-Hajdinjak, I., Kovacevic, A. B., Ilic, D., Popovic, L. C., Dai, X., Jankov, I., Radovic, V., **Sánchez-Sáez, P.**, and Nikutta, R., 2022. *Astronomische Nachrichten*, 343, e210103. “Conditional Neural Process for nonparametric modeling of active galactic nuclei light curves”.
- E. D. Hueichapan, C. Contreras, R. Cartier, P. Lira, **P. Sánchez-Sáez**, B. Milvang-Jensen, J. P. U. Fynbo, J. P. Anderson, M. Hamuy, 2022. *Monthly Notices of the Royal Astronomical Society*, 513, 2965. “Two years of optical and NIR observations of the superluminous supernova UID 30901 discovered by the UltraVISTA SN survey”.
- López-Navas, E. ; Martínez-Aldama, M. L.; Bernal, S.; **Sánchez-Sáez, P.**; Arévalo, P. ; Graham, Matthew J.; Hernández-García, L. ; Lira, P.; Rojas Lobos, P. A., 2022. *Monthly Notices of the Royal Astronomical*

Society: Letters, 513, 57. “Confirming new changing-look AGNs discovered through optical variability using a random forest-based light-curve classifier”.

- R. Carrasco-Davis, E. Reyes, C. Valenzuela, F. Förster, P. A. Estévez, G. Pignata, F. E. Bauer, I. Reyes, **P. Sánchez-Sáez**, et al., 2021, the Astronomical Journal, 162, 231. “Alert Classification for the ALerCE Broker System: The Real-time Stamp Classifier”
- F. Förster, G. Cabrera-Vives, E. Castillo-Navarrete, P. A. Estévez, **P. Sánchez-Sáez**, et al., 2021, the Astronomical Journal, 161, 242. “The Automatic Learning for the Rapid Classification of Events (ALerCE) Alert Broker”
- D. De Cicco , F. E. Bauer, M. Paolillo, S. Cavuoti , **P. Sánchez-Sáez**, W. N. Brandt, G. Pignata, M. Vaccari, M. Radovich, 2021. Astronomy & Astrophysics, 645, 103. “A random forest-based selection of optically variable AGN in the VST-COSMOS field”
- O. Rodríguez; G. Pignata; M. Hamuy; A. Clocchiatti; M. M. Phillips; K. Krisciunas; N. I. Morrell; G. Folatelli; M. Roth; S. Castellón; Y. Apostolovski; P. López; S. Marchi; R. Ramírez; **P. Sánchez**, 2019, Monthly Notices of the Royal Astronomical Society, 483, 5459. “Type II Supernovae as Distance Indicators at Near-IR Wavelengths”.
- Lira, P.; Kaspi, S.; Netzer, H.; Botti, I.; Morrell, N.; Mejia-Restrepo, J.; **Sánchez-Sáez, P**; Martinez, J; Lopez, P, 2018, Astrophysical Journal, 865, 56. “Reverberation mapping of luminous quasars at high-z”.
- R. Cartier, P. Lira, P. Coppi, **P. Sánchez**, P. Arévalo, F. E. Bauer, D. Rabinowitz, Robert Zinn, R. R. Muñoz, N. Meza, 2015, Astrophysical Journal , 810, 164. “The QUEST-La Silla AGN Variability Survey”.
- Fathivavsari, H.; Petitjean, P.; Noterdaeme, P.; Pâris, I.; Finley, H.; López, S.; Srianand, R.; **Sánchez, P.**, 2015, Monthly Notices of the Royal Astronomical Society, 454, 876. “A coronagraphic absorbing cloud reveals the narrow-line region and extended Lyman alpha emission of QSO J0823+0529”.

NON-REFEREED PUBLICATIONS

- R. Cartier, P. Lira, P. Coppi, **P. Sánchez**, P. Arévalo, F. E. Bauer, R. R. Muñoz, 2016, The Messenger, 163, 26. “The QUEST-La Silla AGN Variability Survey”.