

FRANCISCA ESPINOZA ROJAS

PhD Student

@ francisca.espinoza@h-its.org

 0000-0001-9089-0606

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SCIENTIFIC INTERESTS

Asteroseismology, Stellar Astrophysics, Stellar Structure, Spectroscopy, Galactic Archaeology.

FORMATION

2022–present	PHD IN ASTROPHYSICS HEIDELBERG UNIVERSITY, HEIDELBERG, GERMANY. Supervisor : Prof. Dr. Ir. Saskia Hekker
2020–2021	MSc. IN ASTROPHYSICS <i>Summa Cum Laude</i> PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE, SANTIAGO, CHILE Title : “The consistency of chemical clocks among coeval stars” Promoters : Prof. Dr. Julio Chanamé, Prof. Dr. Paula Jofré, Prof. Dr. Márcio Catelán, Prof. Dr. Melissa Ness
2015–2019	BSc. IN ASTRONOMY <i>Summa Cum Laude</i> PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE, SANTIAGO, CHILE Title : “Are the components of Wide Binaries truly co-chemical?” Promoters : Prof. Dr. Julio Chanamé, Prof. Dr. Paula Jofré, Prof. Dr. Claudia Aguilera, Prof. Dr. Nelson Padilla
2013–2014	MATHEMATICAL REASONING LESSONS FOR HIGHSCHOOL STUDENTS PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE, SANTIAGO.

CONFERENCES AND SEMINARS

July 2025	TASC9/KASC16 WORKSHOP, VIENNA, AUSTRIA. Contributed talk. > Title : “Red-giant asteroseismic binaries in the <i>Kepler</i> Field : Identifying gravitationally bound systems” > doi:10.5281/zenodo.17241593
July 2025	BINARY STARS IN THE SPACE ERA, KEELE UNIVERSITY, UK. Poster. > Title : “Asteroseismic binaries in the Kepler Field : Identifying bound systems with <i>Gaia</i> DR3”
June 2025 Online	SDSS-V COLLABORATION MEETING. Heidelberg, Germany.
June 2024	TASC8/KASC15 WORKSHOP, PORTO, PORTUGAL. Poster. > Title : “A comprehensive catalogue of asteroseismic properties of red-giant stars” > doi:10.5281/zenodo.13628498
May 2024	THE MILKY WAY ASSEMBLY TALE, BOLOGNA, ITALY. Poster. > Title : “A comprehensive catalogue of asteroseismic properties of red-giant stars”

December 2023	LARIM XVII, MONTEVIDEO, URUGUAY. Poster. > Title : “Asteroseismic catalogue of <i>Kepler</i> Red Giants”
August 2021	SDSS COLLABORATION MEETING. Contributed talk. > Title : “Exploring the coevality of the components of wide binaries”
June 2021	GALAH SCIENCE MEETING. Contributed talk. > Title : “Assessing chemical clocks in Wide binaries - Prospects for chemical tagging” > Talk recording.
December 2020	XVI SOCHIAS ANNUAL MEETING. Contributed talk. > Title : “Assessing chemical clocks in Wide binaries - Prospects for chemical tagging”

WORKSHOP ATTENDANCE

June 2025 Online	2025 SUMMER SCHOOL IN STATISTICS FOR ASTRONOMERS Penn State University
September 2024	IMPRS-HD SUMMERSCHOOL 2024 <i>“New Opportunities to Test Cosmology”</i> Heidelberg, Germany.
June 2024	ML4ASTRO <i>“Machine Learning in Astrophysical Studies”</i> Heidelberg, Germany.
January 2024	53RD SAAS-FEE ADVANCED COURSE OF THE SWISS SOCIETY FOR ASTROPHYSICS AND ASTRONOMY <i>“From stars to planets in the space-based photometry era”</i> Saas Fee, Switzerland.
September 2021 Online	IMPRS-HD SUMMERSCHOOL 2021 <i>“Stellar Ecosystems”</i> Heidelberg, Germany.
September 2020 Online	THE ALERCE BROKER TUTORIAL <i>“A workshop for ALeRCE users”</i> Santiago, Chile.

MOOCs

MACHINE LEARNING FOUNDATIONS :	2021
A Case Study Approach by Emily Fox and Carlos Guestrin from University of Washington	
MACHINE LEARNING WITH PYTHON :	2021
Intermediate level by Leire Ahedo from Coursera Project Network	
MACHINE LEARNING WITH PYTHON :	2021
Advanced level by Leire Ahedo from Coursera Project Network	

TEACHING

2024	TUTOR. MPIA. Heidelberg University ‣ “FP30 : CCD Photometry in modern Astronomy” (in English), BSc. Physics
2023	TUTOR. Department of Physics. Heidelberg University ‣ “Einführung in die Astronomie I” (in English), BSc. Physics.
2020 2018	TEACHING ASSISTANT. Facultad de Física. Pontificia Universidad Católica de Chile ‣ “Astronomía” (in Spanish), for non-astronomers, BSc. level. ‣ “Astrofísica Estelar” (in Spanish), BSc. Astrophysics. ‣ “Física General” (in Spanish), University College.

RESEARCH POSITIONS

November 2021	INTERNSHIP AT UNIVERSITÉ DE BORDEAUX, FRANCE. “Exploring the Hyades with chemical clocks”. Prof. Caroline Soubiran, Dr. Laia Casamiquela, Dr. Yoann Tarricq, and Prof. Paula Jofré (UDP) ‣ Topic : Using chemical clocks and HDBSCAN for strong chemical tagging of open clusters.
January-July 2019	STUDENT RESEARCHER AT INSTITUTE OF ASTROPHYSICS, PUC, SANTIAGO, CHILE. “Massive White Dwarfs in Wide Binaries”. Prof. Julio Chanamé (PUC) and Prof. Monica Zorotovic (PUCV) ‣ Topic : Discovering formation scenarios of massive white dwarfs based on the color-magnitude diagram, mass distribution, and separation distribution of white dwarfs in wide binary systems.
August-Dec. 2018	STUDENT RESEARCHER AT INSTITUTE OF ASTROPHYSICS, PUC, SANTIAGO, CHILE. “Color-magnitude diagram and mass-metallicity relation for galaxies in SGASJ1226”. Prof. Luis Felipe Barrientos (PUC) ‣ Topic : Characterising the galaxy cluster SGASJ1226 with MUSE observations of Mg I, Na I, and Ca II spectral lines.

July 2018	WINTER RESEARCH WORK (VRI). “Characterization of the gaseous halo of distant galaxies”. Prof. Luis Felipe Barrientos (PUC) > Topic : Creation of a catalogue of members of the galaxy cluster SGASJ1226 based on redshifts extracted from MUSE observations.
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PUBLICATIONS

FIRST-AUTHOR PEER-REVIEWED

1. **Espinoza-Rojas, F.**, Themeßl, N., and Hekker, S. (2025). Red giant asteroseismic binaries in the Kepler field : Identifying gravitationally bound systems. *Astronomy and Astrophysics*, 703, A66. <https://doi.org/10.1051/0004-6361/202555884>
2. **Espinoza-Rojas, F.**, Chanamé, J., Jofré, P., and Casamiquela, L. (2021). The Consistency of Chemical Clocks among Coeval Stars. *The Astrophysical Journal*, 920(2), 94. <https://doi.org/10.3847/1538-4357/ac15fd>

OTHER PEER-REVIEWED

1. Hekker, S., Elsworth, Y., Basu, S., Ahlborn, F., Ball, W. H., et al., and **Espinoza-Rojas, F.** The sensitivity and behaviour of the curvature in the échelle diagram of red-giant stars. *Under review*.
2. Choi, J. Y., **Espinoza-Rojas, F.**, Coppée, Q., and Hekker, S. (2025). Power density spectra morphologies of seismically unresolved red-giant asteroseismic binaries. *Astronomy and Astrophysics*, 699, A180. <https://doi.org/10.1051/0004-6361/202555279>
3. Covelo-Paz, A., Themeßl, N., **Espinoza-Rojas, F.**, and Hekker, S. (2023). New red giants in NGC 6791 and NGC 6819 using Kepler superstamps. *Astronomy and Astrophysics*, 679, A134. <https://doi.org/10.1051/0004-6361/202347211>
4. Casamiquela, L., Olivares, J., Tarricq, Y., Ferrone, S., Soubiran, C., Jofré, P., Di Matteo, P., **Espinoza-Rojas, F.**, Castro-Ginard, A., De Brito Silva, D., and Chanamé, J. (2022). Unravelling UBC 274 : A morphological, kinematical, and chemical analysis of a disrupting open cluster. *Astronomy and Astrophysics*, 664, A31. <https://doi.org/10.1051/0004-6361/202243658>

MEDIA COVERAGE

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| 1 June 2021 | AAS Nova, Astrobites , “Keeping Time in the Milky Way with Chemical Clocks”, Catherine Manea
https://aasnova.org/2021/06/01/keeping-time-in-the-milky-way-with-chemical-clocks/ |
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LANGUAGES

Spoken

- > SPANISH : Mother tongue
- > ENGLISH : Fully proficient
- > GERMAN : A2
- > CHILEAN SIGN LANGUAGE : A1.2

Programming

- > **Python** : Expert
- > **R** : Proficient
- > **TeX** : Proficient