

Dr. Néstor Espinoza

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Appointments

Mission Scientist for Exoplanet Science Space Telescope Science Institute Baltimore, USA	2023A — present
Assistant Astronomer Space Telescope Science Institute Baltimore, USA	2019B — present
Associate Research Scientist Johns Hopkins University Baltimore, USA	2020B — present
Bernoulli Postdoctoral Fellow Max-Planck Institut für Astronomie Heidelberg, Germany	2017B — 2019A

Education

Pontificia Universidad Católica de Chile (PUC) Ph. D. in Astrophysics (<i>summa cum laude</i>) Advisor: Dr. Andrés Jordán	2012 — 2017
Pontificia Universidad Católica de Chile (PUC) Licenciate in Astronomy (<i>summa cum laude</i>) Advisor: Dr. Andrés Jordán	2007 — 2012

Fellowships & Awards

2023 AURA Science Award Institute-wide recognition for “ <i>outstanding contributions to the characterization of exoplanet atmospheres through transit spectroscopy</i> ”.	2024
NASA Silver Group Achievement Award Administration-wide recognition to the JWST Instrument Commissioning Team for “ <i>outstanding expertise and tireless dedication to commission the world-class instruments and subsystems of JWST, producing never-before-seen images of the universe</i> ”.	2024

IAU-Gruber Fellowship	2018
Fellowship awarded by The Gruber Foundation, selected by the International Astronomical Union (IAU, 25,000 USD prize for research).	
Bernoulli Fellowship	2017— 2019
Joint position between the Max-Planck-Institut für Astronomie (MPIA) and the University of Bern.	
100 Young Chilean Leaders	2017
Selected as one of the 100 leaders under 35 by El Mercurio newspaper.	
Adelina Gutiérrez Travel Grant	2017
Research stipend awarded by the Chilean Astronomical Society.	
PUC Young Student Leader	2016
Yearly recognition given to 20 students from the university.	
Kavli Summer Program in Astrophysics Fellowship	2016
Granted to 17 PhD students around the world.	
People's Choice Award	2014
Awarded at the Three Minute Thesis® Competition at PUC.	
Distinguished Graduate Student Award	2014
Yearly award granted by the Chilean Astronomical Society.	
CONICYT Graduate Research Fellowship	2013—2017
Fellowship awarded by the Chilean Ministry of Education.	

Grants

JWST Cycle 2 General Observers (GO) Program	2023B — present
260,000+ USD awarded to the project “Hot Jupiter Atmospheric Forecast: Are mornings cloudier than evenings in other worlds?” (co-PIs: Espinoza & Powell; GO 3969)	
JWST Cycle 2 General Observers (GO) Program	2023B — present
41,000+ USD awarded to the project “Constraining the Oxidation State of the Super-Earth TOI-1685 b” (PI: Fisher; US Admin-PI: Espinoza; GO 4195)	
JWST Cycle 2 General Observers (GO) Program	2023B — present
67,000+ USD awarded to the project “Problem Planets: Understanding the Formation of Giant Planets around Low Mass Stars” (PI: Jordán; US Admin-PI: Espinoza; GO 3731)	
JWST Cycle 2 General Observers (GO) Program	2023B — present
31,000+ USD awarded to the project “Calibrating NIRISS order 3 for very bright time-series observations with JWST.” (PI: Hoeijmakers; US Admin-PI: Espinoza; GO 3279)	

NASA ROSES “Nancy Grace Roman Space Telescope Research and Support Participation Opportunities” 300,000+ USD awarded to co-I Espinoza to lead the Roman Transiting Exoplanet Atmospheric Characterization WG (PI: Quintana; Science PI: Wilson)	2023B — present
JWST Cycle 1 General Observers (GO) Program 160,000+ USD awarded to the project “The First Near-infrared Spectroscopic Phase-curve of a Super-Earth” (PI: Espinoza; GO 2159)	2021B — present
JWST Cycle 1 General Observers (GO) Program 150,000+ USD awarded to the project “Exploring the Morning and Evening Limbs of a Transiting Exoplanet” (PI: Espinoza; GO 2113)	2021B — present
JWST Cycle 1 General Observers (GO) Program 80,000+ USD awarded to the project “TOI-178: the best laboratory for testing planetary formation theories” (PI: Hooton; US Admin-PI: Espinoza; GO 2319)	2021B — present
STScI Director’s Discretionary Funds (DDRF) 45,000+ USD awarded to the project “Supporting Early Career Scientists & the JWST Workshop for 2023 Spring Symposium” (PI: Espinoza).	2022B — present
STScI Director’s Discretionary Funds (DDRF) 60,000+ USD awarded as seed funding for the project “Towards an Exoplanet Census in the Cloud” (PI: Espinoza).	2020B — present
TESS Cycle 3 Guest Investigator Program 40,000 USD allocated to the project “Towards Constraints On Morning And Evening Terminators Of Distant Worlds With TESS” (PI: Espinoza).	2020B — present

Software

Selected software under active development:

juliet — a versatile tool for transiting and non-transiting exoplanetary systems Lead developer juliet.readthedocs.io	2019—present
ExoCTK — the Exoplanet Characterization ToolKit Science lead exoctk.readthedocs.io	2020—present
Transit Spectroscopy Lead Developer github.com/nespinoza/transitspectroscopy	2021—present
tepspec — a pipeline for multi-object transit spectroscopy Lead developer github.com/nespinoza/tepspec	2016—present
abeec — an Approximate Bayesian Computation sampler Lead developer github.com/nespinoza/abeec	2021—present

Publication List

First and second author (student/mentee-led marked in **blue**):

1. **Wang & Espinoza**: *A Blind Search for Transit Depth Variability with TESS*, *The Astronomical Journal* (2023), in press.
2. **Espinoza**, Ubeda, Birkmann et al.: *Spectroscopic Time-series Performance of JWST/NIRSpec from Commissioning Observations*, *Publications of the Astronomical Society of the Pacific* (2023), vol. 135, 018002.
3. Fu, **Espinoza**, Sing, et al.: *Water and an escaping helium tail detected in the hazy and methane-depleted atmosphere of HAT-P-18b from JWST NIRISS/SOSS*, *The Astronomical Journal* (2022), vol. 940, 2, L35.
4. **Allen, Espinoza, Jordán**: *ACCESS: Tentative Detection of H₂O in the Ground-based Optical Transmission Spectrum of the Low-density Hot Saturn HATS-5b*, *The Astronomical Journal* (2022), vol. 164, 153.
5. **Patel & Espinoza**: *Empirical Limb-darkening Coefficients and Transit Parameters of Known Exoplanets from TESS*, *The Astronomical Journal* (2022), vol. 163, 5.
6. Rackham, **Espinoza**, Berdyugina et al.: *Final Report for SAG 21: The Effect of Stellar Contamination on Space-based Transmission Spectroscopy*, Report Submitted to NASA on January 2022; arXiv:2201.09905.
7. **Espinoza**, Pallé, Kemmer et al.: *A transiting, temperate mini-Neptune orbiting the M dwarf TOI-1759 unveiled by TESS*, *The Astronomical Journal* (2022), vol. 163, 3.
8. **Espinoza & Jones**: *Constraining Mornings and Evenings on Distant Worlds: A new Semianalytical Approach and Prospects with Transmission Spectroscopy*, *The Astronomical Journal* (2021), vol. 162, 4.
9. **Jones & Espinoza**: *catwoman: A transit modelling Python package for asymmetric light curves*, *Journal of Open Source Software* (2020), 5, 2382.
10. Yan, **Espinoza**, Molaverdikhani, et al.: *LBT transmission spectroscopy of HAT-P-12b. Confirmation of a cloudy atmosphere with no significant alkali features*, *Astronomy & Astrophysics* (2020), 642, 98.
11. **Espinoza**, Brahm, Henning, et al.: *HD 213885b: A transiting 1-day-period super-Earth with an Earth-like composition around a bright ($V = 7.9$) star unveiled by TESS*, *Monthly Notices of the Royal Astronomical Society* (2020), 491, 2, 2982.
12. **Espinoza**: *On the Transit Probability of the Habitable-zone Exoplanet GJ 357d*, *Research Notes of the American Astronomical Society* (2019), vol. 3, 8.
13. **Espinoza**, Kossakowski & Brahm: *Juliet: a versatile modelling tool for transiting and non-transiting exoplanetary systems*, *Monthly Notices of the Royal Astronomical Society* (2019), vol. 490, 2262.

14. Sandford, **Espinoza**, Brahm, et al.: *Estimation of singly transiting K2 planet periods with Gaia parallaxes*, Monthly Notices of the Royal Astronomical Society (2019), vol. 489, 3149.
15. Kossakowski, **Espinoza**, Brahm, et al.: *TOI-150b and TOI-163b: two transiting hot Jupiters, one eccentric and one inflated, revealed by TESS near and at the edge of the JWST CVZ*, Monthly Notices of the Royal Astronomical Society (2019), vol. 490, 1094.
16. **Espinoza**, Hartman, Bakos, et al.: *HATS-54b-HATS-58Ab: five new transiting hot Jupiters including one with a possible temperate companion*, The Astronomical Journal (2019), vol. 158, 2, 63.
17. Brahm, **Espinoza**, Jordán, et al.: *HD 1397b: A Transiting Warm Giant Planet Orbiting A $V = 7.8$ mag Subgiant Star Discovered by TESS*, The Astronomical Journal (2019), vol. 158, 45.
18. Brahm, **Espinoza**, Rabus, et al.: *K2-161b: a low-density super-Neptune on an eccentric orbit*, Monthly Notices of the Royal Astronomical Society (2019), vol. 483, 2.
19. **Espinoza**, Rackham, Jordán, et al.: *ACCESS: A featureless optical transmission spectrum for WASP-19b from Magellan/IMACS*, Monthly Notices of the Royal Astronomical Society (2019), vol. 482, 2.
20. **Espinoza**: *Efficient Joint Sampling of Impact Parameters and Transit Depths in Transiting Exoplanet Light Curves*, Research Notes of the American Astronomical Society (2018), vol. 2, 4, 209.
21. Jordán & **Espinoza**: *An Alternative Derivation of the Analytic Expression of Transmission Spectra*, Research Notes of the American Astronomical Society (2018), vol. 2, 149.
22. Brahm, **Espinoza**, Jordán, et al.: *K2-232 b: a transiting warm Saturn on an eccentric $P = 11.2$ d orbit around a $V = 9.9$ star*, Monthly Notices of the Royal Astronomical Society (2018), vol. 477, 2572.
23. **Espinoza**, Fortney, Miguel, et al.: *Metal enrichment leads to low atmospheric C/O ratios in transiting giant exoplanets*, Astrophysical Journal Letters (2017), vol. 838, L9.
24. Rackham, **Espinoza**, Apai, et al.: *ACCESS I: An Optical Transmission Spectrum of GJ 1214b Reveals a Heterogeneous Stellar Photosphere*, The Astrophysical Journal (2017), vol. 834, 151.
25. **Espinoza**, Rabus, Brahm, et al.: *EPIC 220504338b: A dense hot-Jupiter transiting a solar analogue*, Monthly Notices of the Royal Astronomical Society (2017), vol. 471, 4374.
26. **Espinoza**, Brahm, Jordán et al.: *Discovery and Validation of a High-Density sub-Neptune from the K2 Mission*, The Astrophysical Journal (2016), vol. 830, 43.
27. **Espinoza**, Bayliss, Hartman et al.: *HATS-25b through HATS-30b: A Half-dozen New Inflated Transiting Hot Jupiters from the HATSouth Survey*, The Astronomical Journal (2016), vol. 152, 108.
28. **Espinoza** & Jordán: *Limb darkening and exoplanets - II. Choosing the best law for optimal retrieval of transit parameters*, Monthly Notices of the Royal Astronomical Society (2016), vol. 457, 3573.
29. **Espinoza** & Jordán: *Limb darkening and exoplanets: testing stellar model atmospheres and identifying biases in transit parameters*, Monthly Notices of the Royal Astronomical Society (2015), vol. 450, 1879.

30. Jordán, Espinoza, Rabus et al.: *A Ground-based Optical Transmission Spectrum of WASP-6b*, The Astrophysical Journal (2013), vol. 778, 184.

Full list of 170+ papers in [ADS](#); h-index: 41.

Invited Talks & Panels

Colloquia & Conference plenaries/reviews (last 5 years):

MIT Astrophysics Colloquium (MKI), MIT, Boston, USA.	03/2024
Open Problems in the Astrophysics of Gas Giants, Puerto Natales, Chile.	12/2023
Institute of Astrophysics Colloquium, Pontificia Universidad Católica de Chile, Santiago, Chile.	12/2022
Astrophysical and Planetary Sciences Colloquium, CU Boulder, Colorado, USA.	11/2022
Physics & Astronomy Colloquium, George Mason University, Virginia, USA.	11/2022
Physics and Astronomy Colloquium, Wayne State University, Michigan, USA (Virtual Colloquium).	10/2022
Ole Rømer Colloquium, Institute of Physics and Astronomy, Aarhus Universitet, Denmark (Virtual Colloquium).	03/2022
Atmospheres, Atmospheres! Do I look like I care about atmospheres? (Atmo 2021; Virtual Conference).	08/2021
Chesapeake Bay Area Exoplanet Meeting, Carnegie DTM, Washington DC, USA.	01/2020
Colloquium Talk, Instituto de Física, Facultad de Ciencias, Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile.	05/2019

Seminars (selected, last 5 years):

Université de Montréal Astrophysics Seminar, Université de Montréal, Montréal, Canada.	02/2024
ExoVAST Virtual Astronomy Software Talk	11/2023
Astronomy Departmental Seminar, Stockholm University, Sweden.	09/2023
ExoGuide Virtual Talk	04/2023

Thirty Minute Talk, ESO-Chile, Santiago, Chile.	12/2022
Astronomy Seminar, University of Sao Paulo, Brazil (Virtual Seminar).	04/2022
Astronomy and Space Physics Seminar, Uppsala University, Sweden (Virtual Seminar).	10/2021
Talk/Tutorial on JWST Data Analysis at the JWST ERS Hackaton (Virtual Workshop).	06/2021
Physics & Astronomy Seminar, Universidad Adolfo Ibáñez, Santiago, Chile (Virtual Seminar).	04/2020
Carnegie DTM Astro Seminar, Carnegie DTM, Washington DC, USA.	01/2020
Planetary and exoplanetary Astronomy Lunch Seminar, University of Maryland, College Park, USA.	11/2019
Talk/Tutorial on JWST Proposal Planning tools at “Rocky Exoplanets in the era of JWST”, NASA Goddard, Greenbelt, USA.	11/2019
Seminar Talk, Departamento de Ciencias Físicas, Facultad de Ciencias Exactas, Universidad Andrés Bello, Santiago, Chile.	05/2019
Seminar Talk, Departamento de Astronomía, U. de Chile, Santiago, Chile.	05/2019
Seminar Talk, Space Telescope Science Institute (STScI), Baltimore, USA.	01/2019

Service

Member of the “Know Thy Star 2” conference SOC	2023—present
Member of the Exoplanet Strategy WG	2023—2024
Member of the “Open Problems in the Astrophysics of Gas Giants” conference SOC	2023
Member of the AAS Weber Prize Committee	2023—present
Co-Organizer & Lecturer of the ExoLatam 2022 Workshop on JWST & exoplanet transit spectroscopy	2022
ExoGuide for NASA’s ExoPAG ExoExplorers Science Series	2022—2023A
Member of the “Towards Other Earths III: The Planet-Star connection” Conference SOC.	2022—2023
Member of the “Planetary Systems and the Origins of Life in the Era of JWST” STScI Spring Symposium Workshop Organizing Committee.	2022—2023

Member of the “Towards the Comprehensive Characterization of Exoplanets” STScI Spring Symposium SOC.	2020—2021
Co-chair of NASA’s ExoPAG Study Analysis Group 21.	2019—2022
Member of the “Eclipsing Exoplanets 2020” conference SOC	2019—2020
Member of the SOC for MPA’s PSF 2018 Retreat	2018
Co-Lead (with E. Pallé) of the CARMENES-TESS Working Group	2018—2022
Reviewer for Nature Astronomy	2021—present
Reviewer for The Journal of Open Source Software	2018—present
Reviewer for The Astrophysical Journal	2018—present
Reviewer for The Astronomical Journal	2019—present
Reviewer for the Astronomy & Computing Journal	2018—present
Reviewer for Publications of the Astronomical Society of the Pacific	2017—present
Reviewer for NSF AAG AST grants	
Reviewer for the Argentinian Commission of Physical Sciences	
Co-Chair of STScI’s Science Recruiting Committee	
Chair, TESS TAC	
Member of NASA’s FINESST fellowship selection panel	
Member of STScI’s fellowship selection committee	
Member of CSH’s fellowship selection committee	

Teaching

Invited Lecturer, Department of Physics & Astronomy, Johns Hopkins University	2021B, 2022B, 2023B
Course: “Planets, Life, and the Universe” (two lectures per semester)	
Teacher, ProCredit Academy, Fürth, Germany	2019A
Course: “The Universe Around Us” (35 hours per course, 4 courses)	
Teacher, Center of Study and Development of Talent, Penta UC, Santiago, Chile	2014A, 2014B, 2016A
Course: “Orders of Magnitude” (50 hours per course)	
Invited Lecturer, Faculty of Economics and Business, U. de Chile, Santiago, Chile	2016A, 2016B, 2017A, 2020A
Course: “Introduction to Science” (one lecture per semester)	
Teaching Assistant:	
ASP5408: Statistics for Astronomers (PUC)	2012—2016
AST0421: Experimental Astrophysics (PUC)	2014B

AST0212: Introduction to Data Analysis (PUC)	2014A
AST1525: Putting Numbers to the Earth and the Universe (PUC)	2014A
AST0311: General Astrophysics (PUC)	2013A
FIS101M: General Physics for the Military School (PUC)	2011B
FIS120: Electricity & Magnetism (UTFSM)	2010—2011

Postdoc Supervision

Dr. Amelie Gressier (co-supervisor) Space Telescope Science Institute	2023 — present
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Student Supervision & Mentoring

Natalie Allen (PhD co-advisor) Project: “Constraining Stellar Contamination in Space Based Transit Spectroscopy” Institution: Johns Hopkins University.	2020B — present
Patrick McCreery (First Year PhD student supervisor) Project: “Improving transit spectroscopy simulations for JWST” Institution: Johns Hopkins University.	2022B — 2023
Yiwei Chai Project: “Exoplanet atmospheres with the Roman Space Telescope” Institution: Johns Hopkins University.	2022B — present
Gavin Wang (PURA research advisor; Undergraduate Student) Project: “Likelihood-based methods for 1/f detector noise” Institution: Johns Hopkins University.	2020B—present
Derod Deal (Mentor; Undergraduate Student) Project: “A quick-look pipeline for the JWST NIRISS/FGS” Institution: STScI/University of Florida (STScI SASP Summer Program).	2023B
Kevin Ortiz-Ceballos (Mentor; Undergraduate Student) Project: “Improving the precision of exoplanet atmospheric detections through pixel-level decorrelation” Institution: STScI/University of Puerto Rico Río Piedras (STScI SASP Summer Program).	2020B
Kathryn Jones (Mentor; Master Student) Project: “Extracting (transit) depths from morning and evening terminators in transit lightcurves” Institution: MPIA, Germany/Oxford, United Kingdom (Summer Program).	2019B
Diana Kossakowski (Mentor; PhD Student) Project: “Gaussian Processes applied to transit lightcurves and radial velocities” Institution: MPIA, Germany.	2018 — 2019
Emily Sandford (Mentor; PhD Student) Project: “Gaia & Singly Transiting Exoplanets” Institution: PGIF Columbia/PUC Exchange Program, USA/Chile.	2018 — 2019

Jayshil Patel (Master Thesis Advisor)

2019A

Thesis title: "Study of the limb darkening effect using exoplanet transit light curves from TESS data" | Institution: S V National Institute of Technology, India.

Jennifer Fienco (Undergraduate Thesis Co-Advisor)

2019A

Thesis title: "Analitical Chemical Equilibrium for Exoplanetary Atmospheres" | Institution: Pontificia Universidad Católica de Chile, Chile.

Roy Van der Westhuizen (Undergraduate Thesis Co-Advisor)

2015B

Thesis title: "Virtual exoplanet laboratory: APIastro" | Institution: Pontificia Universidad Católica de Chile, Chile.