



TO MAGNIFICO RETTORE OF UNIVERSITA' DEGLI STUDI DI MILANO

ID CODE 6510

I the undersigned asks to participate in the public selection, for qualifications and examinations, for the awarding of a type B fellowship at **Dipartimento di Fisica Aldo Pontremoli**

Scientist- in - charge: **Prof. Stefano Faccini**

Felipe Mauricio Alarcón Peña

CURRICULUM VITAE

PERSONAL INFORMATION

Surname	Alarcón Peña
Name	Felipe Mauricio

PRESENT OCCUPATION

Appointment	Structure
PhD candidate - Research Assistant	Graduate student program at University of Michigan, USA

EDUCATION AND TRAINING

Degree	Course of studies	University	year of achievement of the degree
PhD in Astronomy & Astrophysics:	"Hydrodynamical +thermochemical modeling of the planet formation process"	University of Michigan	expected in 2024
Masters of Science in Astronomy (passed with highest honors)	"Physical Conditions and Kinematics in Protoplanetary Disks through Line Emission"	Universidad de Chile	2019
Bachelor of Science in Astronomy (passed with highest honors)	Astronomy	Universidad de Chile	2017



FOREIGN LANGUAGES

Languages	level of knowledge
Spanish	Native
English	Fluent
French	Basic

AWARDS, ACKNOWLEDGEMENTS, SCHOLARSHIPS

Year	Description of award
2023	NRAO SOS grant (~23k USD). Support for tuition+stipend to conduct research for an accepted observing proposal with ALMA.
2019	Rackham International Student Fellowship (~13k USD)
2018-2022	Fulbright Scholar
2018	National Master Fellowship for graduate studies. CONICYT (now ANID), Chile 2018. The Fellowships covers full tuition+stipend to conduct a Masters in a chilean institution
2013-2016	Universidad de Chile Scholar. It covers full tuition of Bachelor's

TRAINING OR RESEARCH ACTIVITY

<p>Ph.D. in Astronomy & Astrophysics (2018-2024), University of Michigan, USA <i>“Hydrodynamical+thermochemical modeling of the planet formation process”</i> Advisor: Prof. Edwin Bergin Description:</p> <p>2024: Data reduction and analysis of a Orion Bar mosaic using the ALMA 12m array and ACA looking for COMs.</p> <p>2022-2023: Constraints in planet finding strategies through numerical and observing approaches.</p> <p>2021-2023: Involvement in the PDRs4All JWST-ERS team as part of the data reduction team</p> <p>2021-2024: Development of code that solves the chemical evolution along streamlines in 3D simulations of protoplanetary disks.</p> <p>2019-2021: Member of the MAPS-ALMA Large Program with involvement in the thermochemical modeling of protoplanetary disks.</p> <p>2018-2019: Project studying the chemical effects of planets producing dust substructures in protoplanetary disks.</p> <p>Technical Skills Acquired:</p> <ul style="list-style-type: none">- JWST data reduction from MIRI, MIRI-MRS and NIRSPEC- RAC2D: 2D Thermochemical code of protoplanetary disks- Meudon: PDR 1-D thermochemical- Development of code for coupling of thermodynamical evolution of gas/dust in protoplanetary disks using Julia.



M.Sc. in Astronomy (2017-2018), Universidad de Chile, Chile

“Physical Conditions and Kinematics in Protoplanetary Disks through Line Emission”

Advisors: Prof. Simón Casassus & Prof. Sebastián Pérez

Description: Radiative Transfer modeling and benchmark of physical conditions retrievals of gas properties through line emission of CO isotopologues in circumstellar disks. Learning of specific software applied to protoplanetary disk science:

- RADMC-3D: Radiative Transfer Code
- FARGO3D: Magneto-Hydrodynamics Code
- CASA: Radioastronomy data reduction software applied to ALMA data.

Visit to CSUN-JPL (02-03/2018), California, USA

“Viscous Heating in FUors, the case of V883 Ori ”

Host: Prof. Wladimir Lyra

Description: Research visit to work with Dr. Lyra to learn how to implement additional heating sources to the radiative transfer modelling of V883 Ori, an outbursting protostar to fit resolved 1.3 millimeter emission observed with the ALMA interferometer.

CONGRESSES AND SEMINARS

Date	Title	Place
03/2024	A new view on protoplanet hunting campaigns, the uprise of the underdogs Invited Talk	Monday Science Seminar, UW-Madison, WI, USA
12/2023	Radiative Transfer Effects of accreting planets in planet-feeding gas Poster	10 years of ALMA, Puerto Varas, Chile
11/2023	Thermochemical evolution in 3D flows of protoplanetary disks Invited Talk	CCA Star and Planet Formation Group, Flatiron Institute, NY, USA
07/2023	Radiative Transfer Effects of accreting planets in planet-feeding gas Poster	2023 Kavli-IAU Astrochemistry Symposium, Traverse City, MI, USA
06/2023	Radiative Transfer Effects of accreting planets in planet-feeding gas Poster	GRC, Hadley, MA, USA
01/2023	The evolution in protoplanetary disks: From thermal changes in outbursting sources to the chemistry of planet-forming regions. Invited Talk	Astrochemistry Seminar, Leiden Observatory, The Netherlands
01/2023	Viscous heating as the dominant heat source inside the snowline of V883 Ori Invited Talk	UAI, Santiago, Chile
10/2022	Chemical Evolution in planet-forming	University of Chicago, IL, USA



	regions of protoplanetary disks	
	Invited Talk	
10/2022	Atomic carbon as a tracer of hidden flows and a kinematic anomaly in the HD 163296 disk Contributed Talk	From Clouds to planets II: The Astrochemical Link, Berlin, Germany
07/2021	Molecules with ALMA at Planet-forming Scales (MAPS). VIII. CO Gap in AS 209-Gas Depletion or Chemical Processing? Contributed Talk	Astrochemical Frontiers 2 (remote)
12/2020	Chemical gap theory applied to AS 209: Revealing the chemistry of Planet Formation Contributed Talk	Five years after HL Tau: a new era in planet formation (remote)
09/2020	Chemical evolution in protoplanetary disk with dust substructure Invited Talk	MPIA - SPF group, Heidelberg, Germany (remote)
07/2020	Chemical evolution in protoplanetary disks with dust substructure Contributed Talk	Astrochemical Frontiers: Quarantine Edition (remote)
06/2019	Chemical evolution in protoplanetary disks with dust substructure Poster	GRC, Hadley, MA, USA
03/2018	Measuring Physical Conditions and turbulent velocity in protoplanetary disks Poster	Diversis Mundi: The solar system in an exoplanetary context, ESO Santiago, Chile

PUBLICATIONS

Refereed Articles published in Scientific Journals
“Viscous heating as the dominant heat source inside the water snowline of V883 Ori” Alarcón, Casassus, Lyra et al, MNRAS 527, 96655 (2024)
“A Localized Kinematic Structure Detected in Atomic Carbon Emission Spatially Coincident with a Proposed Protoplanet in the HD 163296 Disk” Alarcón, Bergin, and Teague ApJL, 941, L24 (2022)
“Molecules with ALMA at Planet-forming Scales (MAPS). VIII. CO Gap in AS 209-Gas Depletion or Chemical Processing?” Alarcón, Bosman, Bergin et al. ApJS, 257, 8 (2021)
“Chemical Evolution in a Protoplanetary Disk within Planet Carved Gaps and Dust Rings” Alarcón, Teague, Zhang et al. ApJ, 905, 68 (2020)
“C I Traces the Disk Atmosphere in the IM Lup Protoplanetary Disk”



Law, Alarcón, Cleeves et al. ApJL, 952, L2 (2023)
“Molecules with ALMA at Planet-forming Scales (MAPS). VII. Substellar O/H and C/H and Superstellar C/O in Planet-feeding Gas” Bosman, Alarcón, Bergin et al. ApJS, 257, 7 (2021)
“Destruction of Refractory Carbon Grains Drives the Final Stage of Protoplanetary Disk Chemistry” Bosman, Alarcón, Zhang et al. ApJ, 910, 3 (2021)
“A far-ultraviolet-driven photoevaporation flow observed in a protoplanetary disk” Berné, Habart, Peeters et al. Science (accepted 2024)
“OH as a probe of the warm-water cycle in planet-forming disks.” Zannese, M., Tabone, B., Habart, E. et al. Nat. Astron. (accepted 2024)
“Formation of the methyl cation by photochemistry in a protoplanetary disk” Berné, Martin-Drumel, Schroetter et al. Nature, 621, 56 (2023)
“Astronomical CH₃⁺ rovibrational assignments. A combined theoretical and experimental study validating observational findings in the d203-506 UV-irradiated protoplanetary disk” Changala, Chen, Le et al. A&A, 680, A19 (2023)
“PDRs4All. VI. Probing the Photochemical Evolution of PAHs in the Orion Bar Using Machine Learning Techniques” Pasquini, Peeters, Schefter et al. A&A, Forthcoming article (accepted 2023)
“PDRs4All. V. Modelling the dust evolution across the illuminated edge of the Orion Bar” Elyajouri, Ysard, Abergel et al. A&A, Forthcoming article (accepted 2023)
“PDRs4All IV. An embarrassment of riches: Aromatic infrared bands in the Orion Bar” Chown, Sidhu, Peeters et al. A&A, Forthcoming article (accepted 2023)
“PDRs4All II: JWST’s NIR and MIR imaging view of the Orion Nebula” Habart, Peeters, Berné et al. A&A, Forthcoming article (accepted 2023)
“Molecules with ALMA at Planet-forming Scales (MAPS): Complex Kinematics in the AS 209 Disk Induced by a Forming Planet and Disk Winds” Galloway-Sprietsma, Bae, Teague et al. ApJ, 950, 147 (2023)
“Molecules with ALMA at Planet-forming Scales (MAPS): A Circumplanetary Disk Candidate in Molecular-line Emission in the AS 209 Disk” Bae, Teague, Andrews et al. ApJL, 934, L20 (2022)
“PDRs4All: A JWST Early Release Science Program on Radiative Feedback from Massive Stars” Berné, Habart, Peeters et al. PASP, 134, 054301 (2022)
“Molecules with ALMA at Planet-forming Scales (MAPS). XV. Tracing Protoplanetary Disk Structure within 20 au” Bosman, Bergin, Loomis et al. ApJS, 257, 15 (2021)
“Molecules with ALMA at Planet-forming Scales (MAPS). XVII. Determining the 2D Thermal Structure of the HD 163296 Disk” Calahan, Bergin, Zhang et al. ApJS, 257, 17 (2021)
“Molecules with ALMA at Planet-forming Scales (MAPS). VI. Distribution of the Small Organics HCN,



C₂H, and H₂CO” Guzmán, Bergner, Law et al. ApJS, 257, 6 (2021)
“Molecules with ALMA at Planet-forming Scales. XX. The Massive Disk around GM Aurigae” Schwarz, Calahan, Zhang et al. ApJS, 257, 20 (2021)
“Molecules with ALMA at Planet-forming Scales (MAPS). I. Program Overview and Highlights” Öberg, Guzmán, Walsh et al. ApJS, 257, 1 (2021)
“Molecules with ALMA at Planet-forming Scales (MAPS). V. CO Gas Distributions” Zhang, Booth, Law et al. ApJS, 257, 5 (2021)
“Molecules with ALMA at Planet-forming Scales (MAPS). III. Characteristics of Radial Chemical Substructures” Law, Loomis, Teague et al. ApJS, 257, 3 (2021)
“Molecules with ALMA at Planet-forming Scales (MAPS). IV. Emission Surfaces and Vertical Distribution of Molecules” Law, Teague, Loomis et al. ApJS, 257, 4 (2021)
“Long Baseline Observations of the HD 100546 Protoplanetary Disk with ALMA” Pérez, Casassus, Hales et al. ApJL, 889, L24 (2020)
“Dust traps in the protoplanetary disc MWC 758: two vortices produced by two giant planets?” Baruteau, Barraza, Pérez et al. MNRAS, 486, 304 (2019)
“Cm-wavelength observations of MWC 758: resolved dust trapping in a vortex” Casassus, Marino, Lyra et al. MNRAS, 483, 3278 (2019)
“An inner warp in the DoAr 44 T Tauri transition disc” Casassus, Avenhaus, Pérez et al. MNRAS, 477, 5104 (2018)

Articles in reviews
“Thermal Structure and Millimeter Emission of Protoplanetary Disk with embedded protoplanets from radiative transfer modeling” Alarcón & Bergin, in review submitted to ApJ
“Extinction values towards embedded planets in protoplanetary disks estimated from hydrodynamic simulations” Alarcón, Bergin & Cugno, in review submitted to ApJ
“Tracking the Chemical Evolution of Hydrocarbons Through Carbon Grain Destruction in Protoplanetary Disks” Raul, Alarcón & Bergin, in review submitted to ApJ



OTHER INFORMATION

CODE AND SOFTWARE PROFICIENCY

Language/Software	Level of Profficiency
Python, Julia	Expert
C++, Fortran	Proficient
R	User
RADMC-3D (Radiative Transfer Code)	Expert
RAC2D (Thermochemical Code)	Expert
FARGO3D (MHD Code)	Proficient
MEUDON (PDR 1D Code)	User

OBSERVING PROPOSALS ACCEPTED

Observatory	Proposals
ALMA	<ul style="list-style-type: none">- PI of Proposal 2023.1.00901.S., 15.7 hours, rank B, Cycle 10- PI of Proposal 2022.1.01308.S., 11.4 hours, rank C, Cycle 9 (observed)- Co-PI of Proposal 2021.1.00899.S, 8.8 hours, rank B, Cycle 8 (observed)- Co-PI of Proposal 2018.1.01309.S, 15.3 hours, rank A, Cycle 5 (observed)
JWST	<ul style="list-style-type: none">- Co-I of Proposal GO 5261, 7.9 hours, Cycle 3- Co-I of Proposal GO 5816, 11.4 hours, Cycle 3
Magellan	<ul style="list-style-type: none">- PI of Magellan/Clay telescope Proposal 2024A, half-night- Co-PI of Magellan/Clay telescope Proposal 2024A, half-night

SERVICE AND OUTREACH

Member of Univeristy of Michigan 2024 PhD Admission Committee, Astronomy Department
Member of Local Organizing Committee (LOC) 2023 Kavli-IAU Astrochemistry Symposium VIII
Organized of Colloquium Speaker Lunch with Graduate Students (2020-2022), University of Michigan
Star and Planet Formation Journal Club Organizer, University of Michigan
Scientific Referee for ApJ, MNRAS and A&A



Astronomy Tutor for Chilean participant in international Astronomy Olympiads (2013-2018)

MENTORING AND TEACHING EXPERIENCE

Period	Role
05-12/2022, 05-12/2023	Advising undergrad Student Mr. Eshan Raul
Winter 2019, Fall 2019	Graduate Student Instructor ASTRO 101, University of Michigan
03-06/2018	Teaching Assistant, <i>Planetary Sciences</i> , Universidad de Chile
03-06/2017, 08-12/2017	Teaching Assistant, <i>Introduction to Cosmology</i> , Universidad de Chile
03-06/2016	Teaching Assistant, <i>Electromagnetism</i> , Universidad de Chile
03-06/2016	Teaching Assistant, <i>Introduction to Algebra</i> , Universidad de Chile
08-12/2015, 08-12/2016	Teaching Assistant, <i>Newtonian Systems</i> , Universidad de Chile
03-16/2015	Teaching Assistant, <i>Introduction to Newtonian Physics</i> , Universidad de Chile

Declarations given in the present curriculum must be considered released according to art. 46 and 47 of DPR n. 445/2000.

The present curriculum does not contain confidential and legal information according to art. 4, paragraph 1, points d) and e) of D.Lgs. 30.06.2003 n. 196.

Please note that CV WILL BE PUBLISHED on the University website and It is recommended that personal and sensitive data should not be included. This template is realized to satisfy the need of publication without personal and sensitive data.

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Place and date: Ann Arbor, MI, USA - 18/03/2024