

Sergio Martin-Alvarez | KIPAC Fellow

Stanford University

✉ martin-alvarez@stanford.edu • 🌐 www.martin-alvarez.com


Updated November 9, 2024.  [0000-0002-4059-9850](https://orcid.org/0000-0002-4059-9850)

TABLE OF CONTENTS

- [1. Professional Appointments](#)
- [2. Education](#)
- [3. Honors & Awards](#)
- [4. Publication List](#)
- [5. Experience](#)
- [6. Supervised Students](#)
- [7. Scientific Presentations](#)

PROFESSIONAL APPOINTMENTS

[\[Link to top\]](#)

KIPAC Fellow, KIPAC	Stanford University	09/2022 – Present
Churchill College By-Fellow, Churchill college	University of Cambridge	10/2019 – 08/2022
Research Associate, Institute of Astronomy & KICC	University of Cambridge	08/2019 – 08/2022

PRE-DOCTORAL EXPERIENCE

Balzan Fellow, Balzan Centre for Cosmological Studies	IAP (Paris)	04/2019 – 06/2019
UV Research Scholarship, Department of A&A	Universitat de València	06/2015 – 09/2015
IAC Research Scholarship, IAC	Instituto de Astrofísica de Canarias	06/2014 – 09/2014

EDUCATION

[\[Link to top\]](#)

PhD, Astrophysics	University of Oxford	10/2015 – 06/2019
Thesis: Magnetic fields in and around galaxies.	With J. Devriendt & A. Slyz	
MSc, Theoretical Physics & Astrophysics	Universitat de València	09/2014 – 07/2015
1st class degree. Thesis: Cosmological shock waves.	With V. Quilès	
MPhys, Physics & Astrophysics	University of Leeds	09/2013 – 06/2014
Erasmus, 1st class degree. Thesis: Blowouts Evolution in ISM Bubbles.	With J. Pittard	
BSc, Physics	Universitat de València	10/2010 – 06/2014
Awarded fully-funded excellence scholarship (5 years, BSc & MSc)		

HONORS & AWARDS

[\[Link to top\]](#)

FELLOWSHIPS, SCHOLARSHIPS AND PRIZES

2022 – Present: KIPAC Fellowship.	Stanford University
June 2024: Kavli Short-term Visitor Fellowship.	University of Cambridge
2024: Nova Talent Top 10 Research & Academia List (Under 35), Spain. Ranked 1st.	Nova Talent
2019 – 2022: Churchill postdoctoral By-Fellowship.	Churchill College, University of Cambridge
2018: Balzan Visitor Fellowship (to visit IAP).	Balzan Centre for Cosmological Studies
2018: Award for excellence in ‘Contribution to Access and Outreach’.	University of Oxford
2017: Highly commended SEPnet communication awards - Stargazing Team.	SEP Network
2015 – 2019: Hintze Doctoral Scholarship.	University of Oxford
2015: Summer Research Scholarship.	Universitat de València
2014: Summer Research Scholarship	Instituto de Astrofísica de Canarias
2013 – 2014: Erasmus Scholarship.	University of Leeds
2010 – 2015: Fully-funded University Scholarship	CMU San Juan de Ribera

COMPUTING TIME (AS PRINCIPAL INVESTIGATOR)

Awarded computational time (in 10^6 CPU hours – MCPUh) listed corresponds **exclusively** to projects for which I was the PI. Full proposals associated with subprojects received higher total amounts (e.g., SPHINX, 68 MCPUh). I have been awarded ~ 70 MCPUh to generate my own numerical simulations. Industry standards value CPUh at ~\$0.014/CPUh or £0.01/CPUh (e.g., [St Andrews HPC Service](#); [AMD EPYC Amazon EC2](#); [Cambridge CSD3 HPC Service \(internal cost\)](#)).

These awards, combined with my track record on simulation software development and generating my own numerical simulations illustrate my independence as a numerical astrophysicist.

Total: 67.15 MCPUh, total computing time awarded as principal investigator

2015–Present

Estimated total value: \$880,000 (£671,500)

9 MCPUh. PI , Understanding radio and FIR Polarimetry with Simulations.	DiRAC, UK	2023
10 MCPUh. co-PI , Primordial Magnetic Fields and Dwarf Galaxies.	DiRAC, UK	2023
20 MCPUh. PI , The First RTCRMHD Galaxy Formation Simulations.	DiRAC, UK	2021
9 MCPUh. Subproject PI , The Influence of PMFs on Cosmic Baryons.	DiRAC, UK	2021
2 MCPUh. PI , The Impact of Magnetic Fields on the ISM of Galaxies.	ARC, Oxford	2017–2019
12 MCPUh. Subproject co-PI , Magnetic Fields in the Epoch of Reionization.	PRACE, EU.	2018
4.5 MCPUh. Subproject PI , Magnetized Galaxy Formation in the SKA Era.	DiRAC, UK	2018
0.65 MCPUh. PI , Magnetic Fields in Galaxy Formation.	ARCHER, UK	2015–2016

GRANTS.....

2022: (Co-I) NASA Astrophysics Decadal Survey Precursor Science (\$ 839 653).

2015 - Present: Minor grants (visitor, research, etc.) amounting to ~ \$14,000, and excluding all professional appointment awards.

PUBLICATION LIST

[\[Link to top\]](#)

An up-to-date list of my publications and additional information can be found on my [website](#) and on [ADS](#).

Underlined paper titles for each publication provide hyperlinks to each publication in the electronic version of this CV.

REFEREED PUBLICATIONS AS LEAD AUTHOR.....

1, S. Martin-Alvarez , M. Rey, D. Sijacki, A. Queen, et al. <i>The Pandora project - III. Cosmic rays and radiation coupling drive the formation of UFD galaxies</i>	<i>MNRAS, in prep.</i> 19pp, 11 figures
2, S. Martin-Alvarez , D. Sijacki, M. Haehnelt, Y. Yuan, et al. <i>The Pandora project - II. non-thermal physics drive episodic SF & continued outflows in dwarfs</i>	<i>MNRAS, submitted soon</i> 17pp, 12 figures
3, S. Martin-Alvarez , V. Iršič, S. Koudmani, et al. <i>Stirring the cosmic pot: how black hole feedback shapes the MPS in the Fable simulations</i>	<i>MNRAS, submitted</i> 17pp, 13 figures
4, S. Martin-Alvarez , E. Lopez-Rodriguez, T. Dacunha, et al. <i>A Tomographic View of FIR and Radio Polarimetric Observations through MHD Sims. of Galaxies</i>	<i>ApJ, 2024</i> 35pp, 17 figures
5, S. Martin-Alvarez , D. Sijacki, M.G. Haehnelt, M. Farcy, et al. <i>Pandora project - I. Impact of RT, MHD, and CRs on baryonic and DM dwarf properties</i>	<i>MNRAS, 2023</i> 26pp, 15 figures
6, S. Martin-Alvarez , J. Devriendt, A. Slyz, D. Sijacki, et al. <i>Towards convergence of turbulent dynamo amplification in cosmological simulations</i>	<i>MNRAS, 2022</i> 20pp, 17 figures
7, S. Martin-Alvarez , H. Katz, D. Sijacki, J. Devriendt, et al. <i>Unravelling the origin of magnetic fields in galaxies</i>	<i>MNRAS, 2021</i> 19pp, 13 figures
Featured in New Scientist	
8, S. Martin-Alvarez , A. Slyz, J. Devriendt, et al. <i>How primordial magnetic fields shrink galaxies</i>	<i>MNRAS, 2020</i> 23pp, 15 figures
Featured in New Scientist	
9, S. Martin-Alvarez , J. Devriendt, A. Slyz, R. Teyssier <i>A three-phase amplification of the cosmic magnetic field in galaxies</i>	<i>MNRAS, 2018</i> 24pp, 20 figures
10, S. Martin-Alvarez , S. Planelles, V. Quilis <i>On the interplay between cosmological shock waves and their environment</i>	<i>ApSS, 2017</i> 16pp, 10 figures
Journal issue cover picture	

REFEREED PUBLICATIONS WITH PRIMARY INVOLVEMENT.....

11, T. Dome, S. Martin-Alvarez , S. Tacchella, Y. Yuan, et al. <i>Increased Burstiness at High-z in Multi-Physics Models Combining SN, RT, and CR</i>	<i>MNRAS, submitted</i> 10pp, 4 figures
Makes use of new RTCRMHD cosmological high-res simulations (Azahar)	
12, M. Sanati, S. Martin-Alvarez , J. Schober, Y. Revaz, A. Slyz, et al. <i>Dwarf galaxies as a probe of a primordially magnetized Universe</i>	<i>A&A, 2024</i> 17pp, 9 figures
13, C. Witten, N. Laporte, S. Martin-Alvarez , D. Sijacki, et al. <i>Deciphering Lyman-α emission deep into the epoch of reionization</i>	<i>Nature Astronomy, 2024</i> 28pp, 6 figures
Performed all the simulation analysis, makes use of my new RTCRMHD cosmological high-res simulations (Azahar)	
14, H. Katz, S. Martin-Alvarez , J. Rosdahl, T. Kimm, J. Blaizot, et al. <i>Introducing SPHINX-MHD: The Impact of Primordial Magnetic Fields</i>	<i>MNRAS, 2021</i> 29pp, 27 figures

15, H. Katz, [S. Martin-Alvarez](#), J. Devriendt, A. Slyz, T. Kimm MNRAS, 2019
Magnetogenesis at Cosmic Dawn: tracing the origins of cosmic magnetic fields 13pp, 9 figures
 Co-first authored

REFEREED PUBLICATIONS FROM SUPERVISED & ADVISED STUDENTS.....

- 16, Y. Yuan, [S. Martin-Alvarez](#), M. Haehnelt, T. Garel, et al. MNRAS, in prep.
Extended red wings and the visibility of reionization-epoch Lyman alpha emitters
- 17, D. Maglioni, [S. Martin-Alvarez](#), E. Lopez-Rodriguez, et al. ApJ, in prep.
The interrelation between magnetic field orientation and gas density structures in the ISM of galaxies
- 18, M. Zhu, E. Lopez-Rodriguez, [S. Martin-Alvarez](#), S. Clark ApJ, in prep.
Voronoi tessellation adaptive spatial remapping of Stokes parameters for polarimetric observations
- 19, T. Dacunha, [S. Martin-Alvarez](#), S.E. Clark, et al. ApJ, submitted
The overestimation of equipartition magnetic field strengths from synchrotron emission 26pp, 12 figures
- 20, Y. Yuan, [S. Martin-Alvarez](#), M.G. Haehnelt, T. Garel, et al. MNRAS, 2024
Ly α emission as a sensitive probe of feedback-regulated LyC escape at high and low redshift 27pp, 16 figures
- 21, F.R. Montero, [S. Martin-Alvarez](#), A. Slyz, J. Devriendt, et al. MNRAS, 2024
The impact of cosmic rays on the ISM and galactic outflows of Milky Way analogues 20pp, 11 figures
- 22, F.R. Montero, [S. Martin-Alvarez](#), D. Sijacki, A. Slyz, et al. MNRAS, 2022
Momentum deposition of supernovae with cosmic rays 17pp, 11 figures

REFEREED PUBLICATIONS AS CONTRIBUTOR.....

- 23, J. Lee, T. Kimm, J. Blaizot, J. Devriendt, H. Katz, [S. Martin-Alvarez](#), et al. MNRAS, in prep.
Jellyfish Galaxies in Magnetic Fields: Insights from Numerical Simulations
- 24, A.S. Borlaff, E. Lopez-Rodriguez, R. Beck, et al. incl. [S. Martin-Alvarez](#) ApJ, 2023
SALSA Legacy Program. V. First Results on the Magnetic Field Orientation of Galaxies
- 25, E. Lopez-Rodriguez, A.S. Borlaff, R. Beck, et al. incl. [S. Martin-Alvarez](#) ApJL, 2023
SALSA Legacy Program: The Magnetic Fields in the Multiphase Interstellar Medium of the Antennae Galaxies
- 26, E. Lopez-Rodriguez, S.A. Mao, R. Beck, et al. incl. [S. Martin-Alvarez](#) ApJ, 2022
SALSA Legacy Program. IV. Program Overview and First Results on the Polarization Fraction
- 27, E. Lopez-Rodriguez, M. Clarke, S. Shenoy, W. Vacca, et al. incl. [S. Martin-Alvarez](#) ApJ, 2022
SALSA Legacy Program. III. First Data Release and On-the-fly Polarization Mapping Characterization
- 28, M. Farcy, J. Rosdahl, Y. Dubois, J. Blaizot, et al. incl. [S. Martin-Alvarez](#) MNRAS, 2022
RMHD simulations of cosmic ray feedback in disc galaxies
- 29, H. Katz, J. Rosdahl, T. Kimm, T. Garel, J. Blaizot, et al. incl. [S. Martin-Alvarez](#) MNRAS, 2022
The Nature of High [OIII]88 μ m/[CII]158 μ m Galaxies in the Epoch of Reionization
- 30, J. Rosdahl, J. Blaizot, H. Katz, T. Kimm, T. Garel, et al. incl. [S. Martin-Alvarez](#) MNRAS, 2022
LyC escape from SPHINX galaxies in the Epoch of Reionization
- 31, O. Attia, R. Teyssier, H. Katz, T. Kimm, [S. Martin-Alvarez](#), et al. MNRAS, 2021
Cosmological magnetogenesis: the Biermann battery during the Epoch of reionization
- 32, C. Gómez-Guijarro, G. Magdis, F. Valentino, et al. incl. [S. Martin-Alvarez](#) ApJ, 2019
Compact Star-forming Galaxies as Old Starbursts Becoming Quiescent
- 33, N.E. Chisari, A.J. Mead, S. Joudaki, P.G. Ferreira, et al. incl. [S. Martin-Alvarez](#) OJA, 2019
Modelling baryonic feedback for survey cosmology

EXPERIENCE [\[Link to top\]](#)

TEACHING EXPERIENCE.....

Note: supervisors (Cambridge) and tutors (Oxford) are roles with similar responsibilities to those of teaching assistants.

Guest Lecturer , Computational Physics (Phys 113)	Stanford University	2024
Supervisor , Statistical Physics (3rd year)	University of Cambridge	2020–2021
Supervisor , Stellar Dynamics & Structure of Galaxies (3rd year)	University of Cambridge	2019–2021
Tutor , C1 Astrophysics (MPhys)	University of Oxford	2016–2019
Junior Demonstrator , Astrophysics Laboratory (3rd year)	University of Oxford	2016–2019
Scholarship Panel Lead Examiner , Physics, English, and Logic	CMU San Juan de Ribera	2015

Conversation Tutor & Group Leader, Spanish (1st year) University of Leeds **2013–2014**

I have also taught several one-off lectures aimed at undergraduate and graduate students on topics such as programming with Python, employing HPC facilities, hydrodynamics, numerical hydrodynamics, and the fundamentals of numerical simulations, amongst others.

PUBLIC OUTREACH SERVICE.....

Invited Lecturer, Starlight Festival Starlight Foundation **2024**

Outreach collaborator, Noches Astronómicas (Outreach in Spanish) Stanford University **2022–Cont**

Executive Committee, KIPAC Community Day (>3000 attendees) Stanford University **2022**

Organiser and coordinator for the lectures series, speakers, and presentations.

Executive Committee, Oxford Stargazing (~1500 attendees per edition) University of Oxford **2016–2018**

Science stands organiser, coordinator, and Section Leader

Outreach Graduate Coordinator, Department of Astrophysics University of Oxford **2016–2018**

Organiser for fortnightly events, workshops for children, and telescope nights.

President & Founder, Students society for Divulgacion Cientifica (València) DivCien **2014–2015**

COMMUNITY SERVICE, MANAGEMENT, AND COMMUNICATION.....

Scholars Selection Committee, KIPAC Post-Baccalaureate KIPAC, Stanford University **2024**

Meeting Organiser, Cosmic Magnetism informal group meetings Stanford University **2022–2024**

Scientific Reviewer, Consolidated Grants panel STFC, UK **2019**

Postdoc Committee Member, Institute of Astronomy University of Cambridge **2020–2022**

Organiser, Postdoc Welcome Week (1stEd.), Institute of Astronomy University of Cambridge **2020–2022**

Seminar Organiser, Galaxies Journal Club University of Cambridge **2020–2022**

Seminar Organiser, Galaxy Evolution Seminar University of Oxford **2019–2020**

Seminar Organiser, Simulators Meeting University of Oxford **2018–2020**

Graduate Community Committee, Christ Church college University of Oxford **2018–2020**

Multiple elected roles, devoted to promote community welfare and inclusion

Welfare Officer (2015-2016), Social Secretary (2015-2016), Ethics & Environment (2016), Dining Officer (2016-2018).

Scholarship Selection Committee, CMU San Juan de Ribera Universitat de València **2015–2016**

Student Representative, Physics Society Universitat de València **2012–2015**

Students Elected Representative, Physics MSc Universitat de València **2014–2015**

Students Elected Representative, Physics BSc Universitat de València **2013–2014**

Conference Organising Committee, 4 events **2021–Present**

Scientific Peer Reviewer, for the journals: MNRAS, OJA, ApJ, A&A **2019–Present**

In addition to my participation in the official programs listed below, I have mentored various students at multiple stages of their careers. Some being my former research & academic students, or high school ones I met during outreach events.

Postgraduate students mentor, Churchill College University of Cambridge **2019–2022**

Postdoctoral mentor, Institute of Astronomy University of Cambridge **2020–2022**

Mentor for International Students, School of Physics Universitat de València **2014–2015**

Mentor for Freshmen Students, School of Physics Universitat de València **2012–2013**

MISCELLANEOUS SCIENTIFIC EXPERIENCE.....

Support astronomer, Department of A&A Universitat de València **02/2015 – 05/2015**

Higgs- $\tau\bar{\tau}$ analysis intern, ATLAS, CERN Universitat de València **06/2013 – 09/2013**

SUPERVISED STUDENTS [\[Link to top\]](#)

Main supervisor for research project is underlined, being highlighted based on scientific advising for the research project.

GRADUATE STUDENTS.....

Tara DaCunha, Stanford, PhD rotation project, main supervisor **04/2023 – Present**

Closing the loop: matching synthetic and real radio observations of galaxies With E. Lopez-Rodriguez & S.E. Clark

Yuxuan Yuan, Cambridge, PhD projects, co-supervisor **09/2021 – Present**

Lya emission as a sensitive probe of feedback-regulated LyC escape With M.G. Haehnelt & D. Sijacki

Francisco Rodriguez-Montero, Oxford, PhD projects, CR science main advisor **09/2020 – Present**

Cosmic ray feedback in simulations of spiral galaxies With J. Devriendt & A. Slyz

Shenghua Liu, Stanford , PhD rotation project, <u>main supervisor</u> <i>The impact of primordial magnetic fields on the matter power spectrum</i>	09/2023 – 01/2024 With S.E. Clark
Jack Dinsmore, Stanford , PhD rotation project, <u>main supervisor</u> <i>Resolved properties of magnetic field in simulated galaxies</i>	Autumn 2022 With E. Lopez-Rodriguez & S.E. Clark
Charlie Brooker, Cambridge , MSc project, <u>main supervisor</u> <i>Galaxy formation and black hole evolution in MHD simulations with AGN</i>	09/2021 – 06/2022 With D. Sijacki
Rahma Alfarsy, Cambridge , MSc project, <u>main supervisor</u> <i>MHD simulations on the emergence of supermassive black holes during cosmic dawn</i>	09/2020 – 06/2021 With D. Sijacki
Francisco Rodriguez-Montero, Cambridge , MSc project, <u>main supervisor</u> <i>MHD simulations of SNe with cosmic rays</i>	09/2019 – 09/2020 With D. Sijacki

UNDERGRADUATE AND SUMMER RESEARCH STUDENTS.....

Students working towards writing a publication from their undergraduate research are highlighted with *

Azana Queen* , Stanford, undergrad. research, co-main supervisor <i>Evaluating the accuracy of IFU velocity measurements with UFD galaxy simulations</i>	04/2023 – Present With <u>M.D.L. Reyes</u> & R. Wechsler
Diego B. Maglione* , Stanford, undergrad. research, <u>main supervisor</u> <i>Magnetic field alignment with density gradients in simulations of galaxies</i>	01/2023 – Present With E. Lopez-Rodriguez & S.E. Clark
Mark T. H. Zhu* , Stanford, undergrad. research, co-supervisor <i>Pixelation techniques to reconstruct polarimetric signals in observations</i>	Summer 2023 – Present With <u>E. Lopez-Rodriguez</u> & S.E. Clark
Yujina Basnet, Stanford , undergrad. research, <u>main supervisor</u> <i>Tracing the pollution of intergalactic magnetic fields from galactic outflows</i>	Summer 2023 With E. Lopez-Rodriguez & S.E. Clark
Jacob Gunn & Stefano Zazzera, Cambridge , Summer scholars, <u>main supervisor</u> <i>The impact of magnetic fields on the LCDM cusp-core problem</i>	Summer 2020
Petr Jakubcik, Oxford , undergrad. research, <u>main supervisor</u> <i>Magnetic field amplification during galaxy mergers</i>	09/2018 – 09/2019 With J. Devriendt & A. Slyz

SCIENTIFIC PRESENTATIONS (SELECTED 10 FROM THE PAST 5 YEARS)

[\[Link to top\]](#)

I have presented more than 40 talks, with more than half of those being invited talks and seminars

1 Invited Seminar , Galaxies Seminar, IoA, Cambridge, UK	2024
2 , AAS Winter Meeting, New Orleans, USA	2024
3 , IAP colloquium: New simulations for new problems in galaxy formation, IAP, Paris, France	2023
4 Invited Talk , The Physics of Cosmic Rays Workshop, Lyon, France	2023
5 Invited Talk , CGI Seminar (UCSC), Santa Cruz, USA	2023
6 Invited Participant , Recent Advances in Galaxy Formation and Reionization, Seoul, Korea	2022
7 Invited Talk , Astrophysics Seminar, University of Surrey, UK	2022
8 Invited Talk , IAU H1 Commission - The Local Universe (virtual)	2021
9 , Cosmic Turbulence and Magnetic Fields, Cargèse, France	2019
10 Invited Talk , Galaxies Seminar, Institut d'Astrophysique de Paris, France	2019