

Sergio Martin-Alvarez | KIPAC Fellow at Stanford University

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This my summarised CV, a more detailed version is available at <https://www.martin-alvarez.com/about-me>

Research interests and research profile:

I generate and study my own numerical simulations to **investigate the formation of galaxies**, from ISM scales (star formation, MHD turbulence, etc.) up to the large scales of our Universe (baryonic feedback and reionization). I am especially interested in **the role played by non-thermal physics such as radiation, cosmic rays, and magnetic fields**, as well as their complex interplay. **Whenever useful for my research, I have developed my own modifications to the RAMSES code, which I mainly use for my simulations.** These span modifications for: quality of life, analysis-related, new physics modules and modifications to the MHD solver. To be able to do my research, **I have led multiple computational time proposals** which granted me extensive computational resources. **I am deeply interested in connecting simulations with observations**, and have the ability to generate **mock multi-wavelength observations of galaxies**: gamma-ray, UV, NIR, as well as **polarimetric observations of FIR, and radio synchrotron emission**. I can also obtain resonant lines using the RASCAS code and IFU-like observations of stellar emission with my newly developed code.

Education

PhD in Astrophysics, University of Oxford	2015 –2019
MSc in Advanced Physics, Universitat de València	2014 –2015
MPhys in Physics & Astrophysics, Universitat of Leeds	2013 –2014
BSc in Physics, Universitat de València	2010 –2014

Research Experience - Astrophysics

KIPAC Fellow, KIPAC, Stanford University	2022 –Present
Churchill College By-Fellow, Churchill college, University of Cambridge	2019 –2022
Research Associate, IoA & KICC, University of Cambridge	2019 –2022
Balzan Fellow, Balzan Centre for Cosmological Studies & IAP (Paris)	2019 –2019
UV Research Scholarship, Department of A&A, Universitat de València	2015 –2015
IAC Research Scholarship, Instituto de Astrofísica de Canarias (IAC)	2014 –2014

Supervised Students

Supervision role is indicated based on scientific advising for the research project.

Graduate Students

Shenghua Liu, Stanford, PhD rotation project, <u>main supervisor</u>	2023 –Present
Tara DaCunha, Stanford, PhD rotation project, <u>main supervisor</u>	2023 –Present
Yuxuan Yuan, Cambridge, PhD project, co-supervisor	2021 –Present
Francisco Rodriguez-Montero, Oxford, PhD project, <u>main advisor</u> for CR science	2020 –Present
Mahsa Sanati, EPFL, PhD projects, <u>main advisor</u> for MHD simulation science	2019 –2023
Jack Dinsmore, Stanford, PhD rotation project, <u>main supervisor</u>	Autumn 2022
Charlie Brooker, Cambridge, MSc project, <u>main supervisor</u>	2021 –2022
Rahma Alfarsy, Cambridge, MSc project, <u>main supervisor</u>	2020 –2021
Francisco Rodriguez-Montero, Cambridge, MSc project, <u>main supervisor</u>	2019 –2020

Undergraduate and Summer Research Students

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

Azana Queen*, Stanford, Undergraduate research, co-main supervisor	2023 –Present
Diego B. Maglione*, Stanford, Undergraduate research, <u>main supervisor</u>	2023 –Present
Yujina Basnet, Stanford, Undergraduate research, <u>main supervisor</u>	Summer 2023
Mark T. H. Zhu*, Stanford, Undergraduate research, co-supervisor	Summer 2023
Jacob Gunn, Cambridge, Summer scholar, <u>main supervisor</u>	Summer 2020
Stefano Zazzera, Cambridge, Summer scholar, <u>main supervisor</u>	Summer 2020
Petr Jakubcik, Oxford, Undergraduate research, <u>main supervisor</u>	2018 –2019

Experience

Academic Teaching

Guest Lecturer for Computational Physics (Physics 113) , Stanford University	2024
Supervisor for Statistical Physics (3rd year) , University of Cambridge	2020–2021
Supervisor for Stellar Dynamics & Structure of Galaxies (3rd year) , University of Cambridge	2019–2021
C1 Astrophysics MPhys Tutor , University of Oxford	2016–2019
Astrophysics Laboratory (3rd year) Junior Demonstrator , University of Oxford	2016–2019
Scholarship Selection Committee & Leading Examiner , CMSJR, Valencia	2015
Spanish BSc Conversation Tutor (1st year) , University of Leeds	2013–2014
Physics and maths personal tutor , for high school and BSc levels (independent)	2008–2013

Public Outreach Service

Invited Speaker , Starlight Festival	June 2024
Noches Astronómicas collaborator (Spanish Outreach) , KIPAC, Stanford University	2022–Present
KIPAC Community Day committee planning committee (>3000 attendees) , Stanford University	2022
Oxford Stargazing Committee (~1500 attendees each edition) , University of Oxford	2016–2018
Outreach graduate coordinator , University of Oxford	2016–2018
DivCien President & Founder , Students society for Divulgacion Científica (València)	2014–2015

Community Service, Management, and Communication

KIPAC Post-Baccalaureate Selection Committee Member , KIPAC, Stanford University	2024
Magcoffee co-organiser , Cosmic Magnetism informal group meetings, Stanford University	2022–2024
Grants panel scientific reviewer , STFC Consolidated Grants	2019
Postdoc Committee member , IoA, University of Cambridge	2020–2022
Postdoc Welcome Week Organiser (1st edition) , IoA, University of Cambridge	2020–2022
Galaxies Journal Club - Seminar organiser , IoA, University of Cambridge	2020–2022
Galaxy Evolution Seminar & Simulators lunch - Seminars organiser , University of Oxford	2018–2020
Graduate Community Committee , Christ Church college, University of Oxford	2018–2020
Welfare Officer (2015/2016) , Social Secretary (2015/2016), Ethics & Environment Officer (2016), Dining Officer (2016/2018)	
Physics Society of Student Representatives , Universitat de València	2012–2015
Physics MSc Students Elected Representative , Universitat de València	2014–2015
Physics BSc Students Elected Representative , Universitat de València	2013–2014
Conference Organising Committee , 3 events	2021–Present
Scientific publications referee , for MNRAS and ApJ journals	2019–Present
Postgraduate students mentor , Churchill College, University of Cambridge	2019–2022
Postdoctoral mentor , IoA, University of Cambridge	2020–2022
Official Mentor for International Incoming Students , Universitat de València	2014–2015
Official Mentor for Freshmen Students , Universitat de València	2012–2013

Miscellaneous experience

Support astronomer , Universitat de València	2015 –2015
Higgs-$\tau\bar{\tau}$ analysis intern , Universitat de València	2013 –2013

Selected Awards

Scholarships and prizes

- 2022 – Present:** KIPAC Fellowship - Stanford University, Stanford.
- 2019 – 2022:** Churchill postdoctoral By-Fellowship - Churchill College, Cambridge.
- 2018:** Balzan visitor Fellowship - Balzan Centre for Cosmological Studies, New College, Oxford.
- 2018:** Commendation to 'Contribution to access and outreach' (University of Oxford - Students Union).
- 2017:** Highly commended SEPnet communication awards - Stargazing Team.
- 2015 – 2019:** Hintze Scholarship - University of Oxford.
- 2015:** Introduction to Research Scholarship - Universitat de València.
- 2014:** Summer Research Scholarship - Instituto de Astrofísica de Canarias

2013 – 2014: Erasmus Scholarship - Leeds university.

2010 – 2015: Fully-funded university Scholarship - CMU San Juan de Ribera.

Computing Time (as Principal Investigator)

9 MCPUh - submitted , PI: Understanding radio and FIR Polarimetry with Simulations. DiRAC, UK.	2023
10 MCPUh - submitted , co-PI: Primordial Magnetic Fields and Dwarf Galaxies. DiRAC, UK.	2023
20 MCPUh, PI: The First Cosmic Ray Radiation-MHD Galaxy Formation Simulations. DiRAC, UK.	2021
9 MCPUh, Subproject PI: The Influence of PMFs on the Cosmic Distribution of 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

Other Skills

Coding Skills & Languages

Basic: HTML, QBasic, MATLAB, CUDA

Intermediate: VisualBasic, R, C/C++

Advanced: PYTHON, Mathematica, L^AT_EX, FORTRAN, OpenMP, MPI

Languages

Spanish: Native

Catalan: Native

English: Bilingual

Mandarin: Basic

Scientific Presentations

I have presented more than 30 talks, with 15 of them being invited talks and seminars

1, AAS Winter meeting, New Orleans, USA	2024
2, IAP colloquium: New simulations for new problems in galaxy formation, Paris, France	2023
3 Invited Contribution , The MW and its high-z progenitors in theory and observations, Cambridge, UK	2023
4 Invited Talk , The Physics of Cosmic Rays Workshop, Lyon, France	2023
5 Invited Colloquium (home institution) , KIPAC, Stanford, USA	2023
6, RAMSES User Meeting 2023 (virtual)	2023
7 Invited Participant , Recent Advances in Galaxy Formation and Reionization, Seoul, Korea	2022
8 Invited Talk , CGI Seminar (UCSC), Santa Cruz, USA	2023
9 Invited Talk , Galaxies Seminar, University of Cambridge, UK	2022
10 Invited Talk , Astrophysics Seminar, University of Surrey, UK	2022
11 Invited Talk , KIPAC Tea Seminar, Stanford University, USA	2022
12 Invited Talk , IAU H1 Commission - The Local Universe (virtual)	2021
13, RAMSES User Meeting 2021 (virtual)	2021
14, RAS meeting: Galactic magnetic fields (virtual)	2021
15 Invited Talk (home institution) , Cosmology Seminar, University of Cambridge, UK (virtual)	2021
16 Invited Talk (home institution) , Institute Seminar, University of Cambridge, UK (virtual)	2021
17 Invited Talk , SPHINX, RASCAS and TRIPLE meeting, Lyon, France (virtual)	2021
18, SPHINX, RASCAS and TRIPLE meeting, Lyon, France (virtual)	2020
19, Cosmic Turbulence and Magnetic Fields, Cargèse, France	2019
20, DiRAC Day 2019, Leicester, UK	2019
21, Modeling MeerKats: Comparing galaxy formation simulations to MeerKAT, Kruger, South Africa	2019
22 Invited Talk , Galaxies Seminar, Institut d'Astrophysique de Paris, France	2019
23, RAMSES User Meeting 2018, Lyon, France	2018
24 Invited Talk , Astrophysics Seminar, University of Bologna, Italy	2018
25 Invited Talk (home institution) , Galaxy Evolution Seminar, University of Oxford, UK	2018
26, Magnetic Fields or Turbulence, Hsinchu, Taiwan	2018
27 Invited Talk , Astrophysics Seminar, University of Surrey, UK	2017
28, Magnetic Fields in the Universe VI, Natal, Brazil	2017
29, RAMSES User Meeting 2017, Nice, France	2017
30, DiRAC Day 2017, Exeter, UK	2017
31, RAMSES User Meeting 2016, Paris, France	2016

Publication List

Find a more up to date list and information about my publications on my [webpage](#) and on [ADS](#).

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

Refereed publications as lead author

- 1, [S. Martin-Alvarez](#), E. Lopez-Rodriguez, T. Dacunha, A.S. Borlaff, S.E. Clark, et al. *ApJ*, 2024
 - 2, [S. Martin-Alvarez](#), D. Sijacki, M.G. Haehnelt, M. Farcy, Y. Dubois, et al. *MNRAS*, 2023
 - 3, [S. Martin-Alvarez](#), J. Devriendt, A. Slyz, D. Sijacki, et al. *MNRAS*, 2022
 - 4, [S. Martin-Alvarez](#), H. Katz, D. Sijacki, J. Devriendt, and A. Slyz *MNRAS*, 2021
- Featured in scientific magazines such as [Academic Times](#) and [New Scientist](#)
- 5, [S. Martin-Alvarez](#), J. Devriendt, A. Slyz, and C. Gomez-Guijarro *MNRAS*, 2020
- Featured in magazines such as [New Scientist](#).
- 6, [S. Martin-Alvarez](#), J. Devriendt, A. Slyz, and R. Teyssier *MNRAS*, 2018
 - 7, [S. Martin-Alvarez](#), S. Planelles, and V. Quilis *ApSS*, 2017
- Journal issue cover picture

Refereed publications as co-first author or with primary involvement

- 8, C. Witten, N. Laporte, [S. Martin-Alvarez](#), D. Sijacki, et al. *Nature Astronomy*, 2024
- Makes use of my new RTCRMHD cosmological high-res simulations. Performed all the simulation analysis.
- 9, H. Katz & [S. Martin-Alvarez](#), J. Rosdahl, T. Kimm, et al. *MNRAS*, 2021
- Co-first authored
- 10, H. Katz & [S. Martin-Alvarez](#), J. Devriendt, A. Slyz, and T. Kimm *MNRAS*, 2019
- Co-first authored

Refereed publications from supervised & advised students

- 11, T. Dacunha, [S. Martin-Alvarez](#), E. Lopez-Rodriguez, and S.E. Clark *ApJ*, in prep
- 12, M. Sanati, [S. Martin-Alvarez](#), J. Schober, and Y. Revaz *A&A*, submitted
- 13, Y. Yuan, [S. Martin-Alvarez](#), M.G. Haehnelt, T. Garel, and D. Sijacki *MNRAS*, submitted
- 14, F. Rodriguez-Montero, [S. Martin-Alvarez](#), A. Slyz, J. Devriendt, et al. *MNRAS*, submitted
- 15, F. Rodriguez-Montero, [S. Martin-Alvarez](#), D. Sijacki, A. Slyz, J. Devriendt, et al. *MNRAS*, 2021

Refereed publications I am part of

- 16, A.S. Borlaff, E. Lopez-Rodriguez, R. Beck, S.E. Clark, et al. including [S. Martin-Alvarez](#) *ApJ*, 2023
- 17, E. Lopez-Rodriguez, A.S. Borlaff, R. Beck, W.T. Reach, et al. including [S. Martin-Alvarez](#) *ApJ*, 2023
- 18, J. Rosdahl, J. Blaizot, H. Katz, T. Kimm, et al. including [S. Martin-Alvarez](#) *MNRAS*, 2022
- 19, E. Lopez-Rodriguez, S.A. Mao, R. Beck, A.S. Borlaff, et al. including [S. Martin-Alvarez](#) *ApJ*, 2022
- 20, E. Lopez-Rodriguez, M. Clarke, S. Shenoy, W. Vacca, et al. including [S. Martin-Alvarez](#) *ApJ*, 2022
- 21, M. Farcy, J. Rosdahl, Y. Dubois, J. Blaizot, and [S. Martin-Alvarez](#) *MNRAS*, 2022
- 22, H. Katz, J. Rosdahl, T. Kimm, T. Garel, et al. including [S. Martin-Alvarez](#) *MNRAS*, 2022
- 23, O. Attia, R. Teyssier, H. Katz, T. Kimm, [S. Martin-Alvarez](#), et al. *MNRAS*, 2021
- 24, C. Gómez-Guijarro, G. E. Magdis, F. Valentino, S. Toft, et al. including [S. Martin-Alvarez](#) *ApJ*, 2019
- 25, N.E. Chisari, A.J. Mead, S. Joudaki, P.G. Ferreira, et al. including [S. Martin-Alvarez](#) *OJA*, 2019