Sergio Martń Alvarez

Postdoctoral researcher in Computational Astrophysics

Research interests:
MHD – Galaxy formation and evolution – Large Scale Structure – Synthethic observations – Numerical Methods

Personal data

Sergio Martín Alvarez, *Castellò de la Plana*, Spain, March, 1992.

Education

05/10/2015 to 21/06/2019 **Ph.D. in Astrophysics**, *University of Oxford*.
Thesis title: Magnetic fields in and around galaxies. Supervised by: J. Devriendt & A. Slyz.

19/09/2014 to 27/07/2015 **MSc Advanced Physics**, *Universitat de València*, in theoretical physics and astrophysics.
Thesis title: Cosmological shock waves. Supervised by: Vicent Quilis. 1st class degree.

30/09/2013 to 20/06/2014 **Erasmus course, MPhys in Physics and Astrophysics**, *University of Leeds*.
Thesis title: Blowouts Evolution in Interstellar Bubbles. Supervised by: J. Pittard. 1st class degree.

13/09/2010 to 20/06/2014 **BSc in Physics**, *Universitat de València*.
General physics. 4 academic years.

Research - Astrophysics

2019 – Present **Research Associate**, *Institute of Astronomy & KICC, University of Cambridge*.
With D. Sijacki and M. Haehnelt

2019 – Present **Churchill postdoctoral By-Fellow**, *Churchill college, University of Cambridge*.

Apr – Jun, 2019 **Balzan Fellow**, *Balzan Centre for Cosmological Studies & Institute d'Astrophysique de Paris*.
With Y. Dubois, working on cosmic rays, magnetic fields, and AGN

2015 – 2019 **Ph.D. in Astrophysics**, *University of Oxford*.
Supervised by J. Devriendt and A. Slyz

Jun – Sep, 2015 **Research scholar**, *Astronomy & Astrophysics - Universitat de València*.
With V. Quilis group, studying cosmological shock waves.

Jun – Sep, 2014 **IAC Research Scholarship**, *Instituto de Astrofísica de Canarias (IAC)*.
Title: A Search for Abnormal Galaxies. Supervised by: I. G. De la Rosa.

Supervised students

Summer 2020 **Jacob Gunn**, *The impact of magnetic fields on the LCDM cusp-core problem*, University of Cambridge, Summer research project.

Summer 2020 **Stefano Zazzera**, *The impact of magnetic fields on the LCDM cusp-core problem*, University of Cambridge, Summer research project.

2019 – 2020 **Francisco Rodriguez**, *MHD simulations of SNe with cosmic rays*, University of Cambridge, Supervision for Part III master research project.
Awarded with Institute of Astronomy Best Master Project Prize

2018 – 2019 **Petr Jakubcik**, *Magnetic field amplification during galaxy mergers*, University of Oxford, Supervision for undergraduate research project.

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Experience

Academic - Teaching and outreach

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

2019 – Present **Supervisor for Stellar Dynamics and Structure of Galaxies**, *University of Cambridge*.
Supervisor for 3rd year module

2016 – 2019 **C1 Astrophysics MPhys tutor**, *University of Oxford*.
Tutor for the C1 Astrophysics MPhys module

2016 – 2019 **Astrophysics lab. junior demonstrator**, *University of Oxford*.
Junior demonstrator in the 3rd year Physics undergrad Astrophysics laboratory

2015 – 2019 **Outreach organiser and speaker**, *University of Oxford*.
Stargazing event, talks, workshops with children, and telescope nights.

2015 **Examiner**, *Colegio Mayor San Juan de Ribera*, Valencia.
Leading examiner for entrance exams in: Physics, English, and Critical Thinking.

2013 – 2014 **Spanish BSc Conversation tutor**, *University of Leeds*.
Spanish I conversation classes, Spanish BSc.

2013 – Present **Outreach speaker**, *independent*.

2008 – 2013 **Personal tutor**, *independent*, Castellón and Valencia.
Individual reinforcement classes of high school and Physics BSc mathematics and physics.

Physics and Astrophysics

Feb – May, 2015 **Support astronomer**, *Universitat de València*.
Developing software, operating the telescopes (12 full nights) and attending visitors.

Jul – Aug, 2013 **Participant**, *International Astronomers Young Camp - Observational X-ray group*.
Analysis of the metalicity in the outskirts of SUZAKU data for thePerseus cluster using the XSPEC 12.8.0 software.

Jun – Sep 2013 **Higgs-$\tau\bar{\tau}$ analysis intern**, *ATLAS - Instituto de Física Corpuscular*, València.
Statistical analysis of 20.3 luminosity data simulations for channel Higgs to $\tau\bar{\tau}$ (ROOT).

Organisation, communication, and management

2019 – 2020 **Seminar organiser**, *University of Cambridge*, Galaxies journal club.

2018 – 2019 **Seminar organiser**, *University of Oxford*, GES and simulators meeting.

2016 – 2018 **Graduate students outreach rep.**, *University of Oxford*.

2015 – 2018 **Welfare Officer** (2015 - 2016)**, social secretary** (2015 - 2016)**, ethics and environment officer** (2016)**, food & dinning officer** (2016 - 2018),
Christ Church College - University of Oxford.

2014 – 2015 **President and Founder**, *Student Association for Scientific Divulgation*, València.

2014 – 2015 **Physics MSc. Student representative**, *Universitat de València*.

2014 – 2015 **Official tutor for international incoming students**, *Universitat de València*.

2014 – 2015 **Physics BSc. Student representative**, *Universitat de València*.

2012 – 2015 **Physics Association of Student Representatives**, *Universitat de València*.

2012 – 2013 **Official tutor for freshmen students**, *Universitat de València*.

Selected awards

Scholarships and prizes

2019 – Present Churchill postdoctoral By-Fellowship - Churchill College, Cambridge.

2018 Balzan visitor Fellowship - Balzan Centre for Cosmological Studies, New College, Oxford.

2018 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 IAC Summer Research Scholarship.

2013 – 2014 Erasmus Scholarship - Leeds university.

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

Grants

2015 – 2017 Christ Church travel grant (£700).

2016 – 2017 Royal Astronomical Society travel grant - to attend MFUVI (£700).

2015, 2017 Christ Church studies grant (£315).

Awarded computing time

2015 – 2016 **PI: Magnetic fields in galaxy formation**, *ARCHER, UK*.
650k hours awarded

2018 **Lead co-I: Magnetized Galaxy Formation in the SKA Precursor Era**, *DiRAC, UK*, Proposal: Modelling galaxy baryon physics from cosmological to galactic scales, P.I.: A. Slyz.
3 million hours awarded for the indicated part of the proposal

2018 **Lead co-I: Magnetic fields in the Epoch of Reionization**, *PRACE, EU*, Proposal: The first luminous objects and reionization with SPHINX, P.I.: J. Rosdahl.
12 million hours awarded for the indicated part of the proposal

2017 – 2018 **PI: Resolution tests of magnetic amplification and saturation in galaxies**, *ARC, Oxford*.
1 million hours awarded for the proposal

2019 **PI: The effect of magnetic fields on the ISM of galaxies**, *ARC, Oxford*.
750k hours awarded for the proposal

Computer skills

Numerical simulations

Simulation RAMSES, MASCLET

Analysis PyMSES, yT, PyNbody

General

Basic HTML, QBasic, MATLAB, CUDA

Intermediate VisualBasic, R, OpenMP

Advanced PYTHON, Mathematica, LaTeX, C++, FORTRAN, MPI

Others

Misc. Astro IDL, MAGPHYS, STARLIGHT, TOPCAT, Aladin, DS9

Languages

Spanish **Native**

Catalan **Native**

English **Bilingual**

Mandarin **Basic**

Scientific contributions

Refereed publications

2020 **How primordial magnetic fields shrink galaxies**,
Martin-Alvarez, et al. 2020, MNRAS.
Featured in New Scientist: The Milky Way may have been shrunk down by ancient magnetic fields

2019 **Compact Star-Forming Galaxies as Old Starbursts Becoming Quiescent** , *Gómez-Guijarro et al. 2019*, ApJ.

2019 **Modelling baryonic feedback for survey cosmology** , *Chisari et al. 2019*, OJA.

2019 **Magnetogenesis at cosmic dawn: tracing the origins of cosmic magnetic fields**,
Co-first authored: Katz & Martin-Alvarez, et al. 2019, MNRAS.

2018 **A three-phase amplification of the cosmic magnetic field in spiral galaxies**, *Martin-Alvarez et al. 2018*, MNRAS.

2017 **On the interplay between cosmological shock waves and their environment**, *Martin-Alvarez et al. 2017*, Astrophysics and Space Science.
Journal issue cover picture

Presentations

2019 **Unveiling the origin of galactic magnetic fields**.
Invited talk, Institute d'Astrophysique de Paris, France

2018 **On the origin of galactic magnetic fields**.
RAMSES User Meeting 2018, Lyon, France

2018 **In and around: galaxies, magnetism, and star formation**.
Invited talk, University of Bologna, Italy

2018 **Magneto-thermo-turbulent star formation in cosmic spiral galaxies**.
Magnetic fields or Turbulence conference. Hsinchu, Taiwan

2018 **Magnetism in and around galaxies: primordial magnetism, and star formation**.
University of Oxford, UK

2017 **Mag. in galaxies: the turbulent dynamo in a cosmological context**.
Invited talk, Surrey University, UK

2017 **Triphasic dynamo amplification: cosmic magnetic fields in galaxies**.
Magnetic Fields in the Universe VI conference, Natal, Brasil

2017 **Triphasic dynamo amplification: cosmic magnetic fields in spiral galaxies**.
RAMSES User Meeting 2017, Nice, France

2017 **Triphasic dynamo amplification: cosmic magnetic fields in spiral galaxies**.
DiRAC Day 2017, Exeter, UK

2016 **On magnetic fields in galaxies: a small scale dynamo in a cosmological context**.
RAMSES User Meeting 2016, Paris, France

2016 **Magnetic fields in galaxies: the small scale dynamo in a cosmological context**.
DiRAC Day 2016, Ediburgh, UK

Posters

2016 **Magnetic fields in galaxies: the small scale dynamo in a cosmological context**, *DiRAC Day 2016 poster*.

2017 **Magnetic collapse in a NUTshell: the impact of magnetic initial conditions on galaxies**, *DiRAC Day 2017 poster*.

2018 **Magneto-thermo-turbulent star formation in cosmic zoom-in spirals**, *EWASS 2018 poster*.