CONTACT DETAILS
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DATE OF BIRTH 15th March 1989

NATIONALITY British

ACADEMIC HISTORY

January 2024 - Present: **IFCA (UC-CSIC), Santander**
Científico Titular (Tenured Scientist) of the *Consejo Superior de Investigaciones Científicas* (CSIC)

January 2023 - December 2023: **IFCA (UC-CSIC), Santander**
Ramón y Cajal Fellow (CSIC)
Project title: "New Searches for Dark Matter on Earth and in Space"

March 2020 - December 2022: **IFCA (UC-CSIC), Santander**
María de Maeztu Unit of Excellence Post-doctoral Position
Supervisor: Enrique González Martínez

September 2017 - February 2020: **GRAPPA, University of Amsterdam**
GRAPPA Post-doctoral Position
Supervisors: Dr. Gianfranco Bertone & Dr. Christoph Weniger

October 2014 - August 2017: **LPTHE, Paris & IPhT, CEA/Saclay**
NewDark ERC Post-doctoral Fellowship
Supervisor: Dr. Marco Cirelli

September 2011 - September 2014: **University of Nottingham, UK**
PhD, Particle Theory Group
PhD Thesis: "Confronting Astrophysical Uncertainties in the Direct Detection of Dark Matter"
Supervisor: Dr. Anne M. Green

September 2010 - June 2011: **University of Cambridge, UK**
Master of Science (MSci): Theoretical Physics
Master's thesis: "Wavepacket scattering simulations using GPGPU"

September 2007 - June 2010: **University of Cambridge, UK**
Bachelor of Arts (BA): Natural Sciences (Physical)
First class honours degree (ranked 13 out of 578).

RESEARCH INTERESTS

My main interest is in the phenomenology of **particle dark matter** (DM). My primary focus has been on the **direct detection** of DM in underground laboratory experiments. I have previously demonstrated how the astrophysics and particle physics properties of a new DM particle could be robustly determined, and I continue to study novel signatures in the direct search for DM. With the advent of **gravitational wave (GW) astronomy**, I have begun focusing on the effects of DM on GWs from compact object mergers. In particular, I am interested in whether dense DM halos around **black holes (both primordial and astrophysical)** can be detected through their influence on merger rates and gravitational waveforms.

PUBLICATIONS (LIST ONLINE)

58 publications (49 peer-reviewed). These include 5 single-author papers, 16 first-author papers, 1 paper published in *Nature Astronomy*, 5 papers published in *Physical Review Letters* and 6 contributions to White Papers.

SELECTED TALKS (SLIDES ONLINE)

Invited Overview Talk, IRN Terascale Meeting (Online), 5 November 2020
Title: "Constantly changing constraints on Primordial Black Hole Dark Matter"

IFCA Colloquium, Santander, Spain, 7 October 2019
Title: "Dark Matter, Black Holes, Gravitational Waves and Werewolves"

Invited Overview Talk, Dark Side of the Universe 2018, Annecy, 25 June 2018
Title: "Signal Diversity and EFT in Dark Matter Direct Detection"

[Video] Invited Overview Talk, DM-Stat Workshop, Banff, 26 February 2018
Title: "An Introduction to Dark Matter"

Teaching & Supervision

Astroparticle Physics Course for bachelor's students (14 weeks; course design, lectures, TA sessions & grading; Amsterdam University College, 2019).

Theory Workshop for third-year bachelor's students (4 weeks; lectures, examples classes & project supervision in astroparticle physics; Institute for Theoretical Physics Amsterdam, 2018 & 2019).

GRAPPA Student Seminar series for first-year MSc students (4 weeks; lectures & project supervision in astroparticle physics; University of Amsterdam, 2018).

Individual student supervision:

- Jose Maria Palencia (PhD), University of Cantabria, 2021-2025
- Pratibha Jangra (PhD), University of Cantabria, 2020-2024
- Agustín Lantero Barreda (PhD), University of Cantabria, 2019-2024
- Abram Pérez Herrero (Masters), University of Cantabria, 2021-2022
- Juan Cortabitarte Gutierrez (Masters), University of Cantabria, 2020-2021
- Konstantinos Antoniadis (Masters), University of Amsterdam, 2019-2020

Grants, Awards & Prizes

Consolidación Investigadora 2023, "*Towards the first Gravitational Wave search for Dark Matter Spikes around Black Holes* (DarkSpikesGW)" (Agencia Estatal de Investigación, Spain)
PI, ∼**200k€** , Jan 2024 - Dec 2025.

Proyectos de Generación de Conocimiento 2022, "*Search for light Dark Matter: From phenomenology to underground lab searches* (DMpheno2lab)"(Agencia Estatal de Investigación, Spain)
PI (co-PI: Rocío Vilar Cortabitarte), ∼**280k€**, October 2023 - September 2026.

Ramón y Cajal Fellowship 2021, "*New Searches for Dark Matter on Earth and in Space*" (Agencia Estatal de Investigación, Spain)
PI, ∼**235k€** , Jan 2023 - Dec 2027 [Renounced Jan 2024].

FELLINI Fellowship for Innovation, "*Detecting Dark Matter dresses around Black Holes with Gravitational Waves* (DarkDressGW)" (INFN Marie Sklodowska-Curie COFUND Fellowship Programme)
PI, ∼**200k€**, 2020 [Declined Jan 2020].

Institute of Physics (IOP) Astroparticle Physics Thesis prize, 2016.

Foundation Scholarship (for achieving a First class mark in all papers), University of Cambridge, UK, 2009, 2010, 2011.

David Thompson Scholarship (for achieving a First class mark), University of Cambridge, UK, 2008.

Computer Skills (code online)

Languages & Software: C/C++, CUDA (GPGPU programming), Fortran, Python, MATLAB, Mathematica, Git, high-performance computing, N-body simulation.

Operating Systems: Windows, Linux, Mac OS X.

Conference Organisation

Dark Matter 2023: From the Smallest to the Largest Scales (DM2023), Head of the Local Organising Committee (Santander, 2023).

Dark Collaboration Workshop 2022, Head of the Local Organising Committee (Santander, 2022).

Dark Matter 2021: From the Smallest to the Largest Scales (DM2021), Head of the Local Organising Committee (Virtual/Santander, 2021).

Gravitational Wave Probes of Fundamental Physics (GW4FP), Local Organiser (Amsterdam, 2019).

PHYSTAT Dark Matter, Scientific Advisory Committee (Stockholm, 2019).

7th Amsterdam-Paris-Stockholm meeting (2017).

NewDark mini-workshops: 'LCDM, Modified Gravity or new Dark Matter models?' (2017), 'Dark Matter and Stars' (2016) and 'Axion Theory and Searches' (2015) in Paris, France.

Other Relevant Experience

Founder and current organiser of the 'Dark Collaboration' working group at IFCA, Santander, aiming to develop new project ideas and collaborations between the local Cosmology and High Energy Physics groups.

Member of the Square Kilometer Array (SKA) 'Gravitational Waves' working group; Athena X-ray observatory 'Physics Beyond the Standard Model' working group; Laser Interferometer Space Antenna (LISA) Consortium; Lunar Gravitational Wave Antenna (LGWA) working group; and CADEX collaboration.

Referee for grant proposals from the STFC (UK), ISF (Isreal), ANID (Chile) and ERC; and for manuscripts in PRL, PRD, PRR, JCAP, EPJC, Physics of the Dark Universe, Open Journal of Astrophysics & Journal of Open Source Software.

Coordinating and editing publication of outreach article on the NewDark research group: 'Dark is the new black' (Scientia, 2016).

Journal Club organiser and chair at University of Nottingham (2013) and at GRAPPA, University of Amsterdam (2018-2020).

REFEREES

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