

Joaquín Sureda

PHD STUDENT · ASTROPHYSICS

Munich, Germany

✉ joaquin.m.sureda@durham.ac.uk | 🏠 jmsureda.github.io | 📄 ADS Profile | 📞 0000-0003-2348-8267 | 📷 jmsureda

Education

Institute for Computational Cosmology - Durham University

PHD IN ASTROPHYSICS

[Durham, UK](#)

Oct. 2022 - Current

- **Advisors:** Dr. Azadeh Fattahi and Dr. Sownak Bose

Instituto de Astrofísica - Pontificia Universidad Católica de Chile

M.S. IN ASTROPHYSICS

[Santiago, Chile](#)

Mar. 2019 - Dic. 2021

- **Thesis:** Primordial black holes as dark matter candidates
- **Advisors:** Prof. Nelson Padilla and Prof. Ignacio Araya
- **Examiners:** Prof. Gonzalo Palma and Prof. Claudio Dib

Pontificia Universidad Católica de Chile

B.S. IN ASTRONOMY

[Santiago, Chile](#)

Mar. 2012 - Dic. 2018

- **Final Project:** Gravitational waves background in an expanding Universe
- **Advisors:** Prof. Jorge Alfaro
- **Examiners:** Prof. Benjamin Koch and Prof. Nelson Padilla

Research Experience

Institute for Computational Cosmology - Durham University

PHD RESEARCH

[Durham, UK](#)

Oct. 2022 - Current

- Studied extremely high-resolution simulations of dwarf galaxies to understand their formation and about dark matter.

Supervisors:

- Dr. Azadeh Fattahi, Institute for Computational Cosmology, Durham University, UK.
- Dr. Sownak Bose, Institute for Computational Cosmology, Durham University, UK.

European Southern Observatory (ESO)

ESO STUDENTSHIP

[Garching, Germany](#)

Sep. 2024 - Ago 2025

- Obtained a studentship to carry on a project to understand the formation mechanisms for nuclear star clusters in dwarf galaxies. The project contemplates the use of simulations and observed data.

Supervisors:

- Dr. Mariya Lyubenova, European Southern Observatory, Garching, Germany
- Dr. Azadeh Fattahi, Institute for Computational Cosmology, Durham University, UK.

Donostia International Physics Center

RESEARCH ASSISTANT

[Donostia - San Sebastián, Spain](#)

Dec. 2021 - Sep. 2022

- Prepared scaling tests for a high-resolution cosmological dark matter only simulation to study the first structures in the Universe.

Supervisor:

- Prof. Silvia Bonoli, Donostia International Physics Center, Spain.

Pontificia Universidad Católica de Chile

MSC RESEARCH

[Santiago, Chile](#)

Dec. 2018 - Dec. 2021

- Research in Primordial black holes as dark matter.

Supervisors:

- Prof. Nelson Padilla, Instituto de Astrofísica, Pontificia Universidad Católica de Chile.
- Prof. Ignacio Araya, Instituto de Ciencias Exactas y Naturales, Universidad Arturo Prat.

Extracurricular Activity

Small Galaxies, Cosmic Questions 2024

LOC FOR THE CONFERENCE

[Durham, UK](#)

Feb. 2024 - Aug. 2024

- Design conference Logo
- Assist with coordination during conference

Institute for Computational Cosmology

STUDENT REP

[Durham, UK](#)

Jun. 2023 - Aug. 2024

- Attend the monthly staff meetings of the institute
- Provide communication between the students and the staff

Astro-PhD coding club

ORGANISER

- Organised bi-weekly meetings for the members of the club.
- Maintained and updated the GitHub repository for the club.

Durham, UK

Feb. 2023 - Aug. 2024

Global Citizenship Programme - Ustinov College

GCP SCHOLAR OF CAFÉ SCIENTIFIQUE

- Organised different activities for the college related to science.
- Oversaw some joint activities with other members of the GCP.

Durham, UK

Oct. 2022 - Sep. 2023

Teaching Experience

Computing Workshop Demonstrator

DISCOVERY SKILLS IN PHYSICS

Assistant for the computing workshop, part of the Discovery Skills in Physics 1 at Durham University.

Durham, UK

Oct. 2023 - July. 2024

Teaching Assistant

EXTRAGALACTIC ASTROPHYSICS - PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE

Teaching assistant in the extragalactic astrophysics course at Pontificia Universidad Católica de Chile.

Santiago, Chile

Feb. 2021 - Jul. 2021

Teaching Assistant

ASTRONOMY - PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE

Teaching assistant in the astronomy course at Pontificia Universidad Católica de Chile.

Santiago, Chile

Jul. 2020 - Dec. 2022

Teaching Assistant

ASTRONOMY - PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE

Teaching assistant in the astronomy course at Pontificia Universidad Católica de Chile.

Santiago, Chile

Jun. 2019 - Dec. 2019

Teaching Assistant

CALCULUS I - PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE

Teaching assistant in the Calculus I laboratory at Pontificia Universidad Católica de Chile.

Santiago, Chile

Mar. 2019 - Jun. 2019

Conferences and Seminars

Deciphering the Cosmic Code for Galaxy Formation 2024

PARTICIPANT

- Poster presented at the conference
"LYRA: Insights into Dwarf Galaxy Evolution with high-resolution zoom-in simulations".

Puerto Varas, Chile

09 Dec. 2024 - 13 Dec. 2024

Small Galaxies, Cosmic Questions 2024

PARTICIPANT

- Talk presented at the conference
"Insight into Dwarf Galaxy Evolution: LYRA Simulation Perspectives".

Durham, UK

29 Jul. 2024 - 02 Aug. 2024

Building Galaxies From Scratch

PARTICIPANT

- Talk presented at the conference
"LYRA: Probing the high-resolution regime of cosmological zoom-in simulations".

Vienna, Austria

19 Feb. 2024 - 23 Feb. 2024

DEX-XX

PARTICIPANT

- Talk presented at the conference - **Obtained award for best long talk of Day 1**
"Insights into Dwarf Galaxy Evolution: Perspectives from the LYRA Simulations".

Durham, UK

11 Jan. 2024 - 12 Jan. 2024

National Astronomy Meeting 2023

PARTICIPANT

- Talk presented in the Simulations session
"LYRA: Probing the high-resolution regime of cosmological zoom-in simulations".
- Talk presented in the Galactic Archaeology session
"LYRA: Old stellar populations with high-resolution simulations of dwarf galaxies"

Cardiff, UK

03 Jul. 2023 - 07 Jul. 2023

Friends Of Friends Virtual Meeting 2022

INVITED DEMONSTRATOR FOR HANDS-ON SESSION

- **Co-organised a hands-on session** on Primordial black holes as dark matter candidates

Virtual - Córdoba, Argentina

18 Apr. 2022 - 22 Apr. 2022

DIPC Seminar

PARTICIPANT

[Donostia - San Sebastián, Spain](#)

11 Feb 2022

- Seminar presented at Donostia International Physics Center
"Primordial black holes as dark matter candidates"

Cosmology from Home

PARTICIPANT

[Virtual - UK](#)

04 Jul. 2021 - 15 Jul. 2021

- Short-talk presented at the conference.

Friends Of Friends Virtual Meeting 2021

PARTICIPANT

[Virtual - Córdoba, Argentina](#)

24 Apr. 2021 - 28 Apr. 2021

- Recorded talk presented at the meeting.

Cosmología y Gravitación en el Cono Sur

ATTENDEE

[Valparaiso, Chile](#)

05 Oct. 2019 - 09 Oct. 2019

- Attendee at a seminar related to Cosmology and Gravitation.

Latin American Symposium of High Energy Physics

PARTICIPANT

[Lima, Peru](#)

23 Nov. 2018 - 27 Nov. 2018

- Poster presented at the symposium entitled
"An alternative explanation to accelerating Universe without Lambda in concordance with the last H_0 measured value".

XXI Simposio Chileno de Física

PARTICIPANT

[Antofagasta, Chile](#)

13 Nov. 2018 - 15 Nov. 2018

- Poster presented at the symposium entitled
"An alternative explanation to accelerating Universe without Lambda in concordance with the last H_0 measured value".

La parte y el todo: Tópicos avanzados en Física de Altas Energías y Gravitación

ATTENDEE

[Villarrica, Chile](#)

02 Jan. 2018 - 04 Jan. 2018

- Attendee at the symposium related to High energy physics and gravitation

Outreach

Schülerpraktikum / Pupils Internship - ESO

DEMONSTRATOR

[Garching bei München, Germany](#)

Apr. 2025

- Workshop demonstrator for galaxy simulations and morphology as part of the pupils internship aimed at school students between the age of 14 and 18.

Summer Science Festival

VOLUNTEER

[Cheshire, UK](#)

Sep. 2024

- Volunteer at a science festival at the Jodrell Bank Observatory.

Celebrate Science

VOLUNTEER

[Durham, UK](#)

Oct. 2022

- Volunteer at a science festival aimed at school kids.

Congreso Astronómico Escolar

INSTRUCTOR

[Chile](#)

2019 - 2020

- Instructor at a scholar activity related to astronomy.

Día del Patrimonio

INSTRUCTOR

[Santiago, Chile](#)

24 May. 2019

- Outreach activity at Manuel Foster Observatory, PUC.

Publications

Extended primordial black hole mass functions with a spike

JUAN MAGANA, MARCO SAN MARTIN, JOAQUIN SUREDA, MARCELO E. RUBIO, IGNACIO J. ARAYA, NELSON D. PADILLA

2023

<https://doi.org/10.1093/mnras/stad261>

Dark matter from primordial black holes would hold charge

IGNACIO J. ARAYA, NELSON D. PADILLA, MARCELO E. RUBIO, JOAQUIN SUREDA, JUAN MAGANA

2023

<https://doi.org/10.1088/1475-7516/2023/02/030>

Pytearcat: PYthon TEnsor AlgeBRa calCulATor A python package for general relativity and tensor calculus

MARCO SAN MARTIN, JOAQUIN SUREDA

2022

<https://doi.org/10.1016/j.ascom.2022.100572>

Press-Schechter primordial black hole mass functions and their observational constraints

JOAQUIN SUREDA, JUAN MAGANA, IGNACIO J. ARAYA, NELSON D. PADILLA

2021

<https://doi.org/10.1093/mnras/stab2450>

Magnetic field generation from primordial black hole distributions

IGNACIO J. ARAYA, MARCELO E. RUBIO, MARCO SAN MARTIN, FEDERICO A. STASYSZYN, NELSON D. PADILLA, JUAN MAGANA,

2020

JOAQUIN SUREDA

<https://doi.org/10.1093/mnras/stab729>

Power spectrum of density fluctuations, halo abundances and clustering with primordial black holes

NELSON PADILLA, JUAN MAGANA, JOAQUIN SUREDA, IGNACIO ARAYA

2020

<https://doi.org/10.1093/mnras/stab1115>

An Accelerating Universe without Lambda: Delta Gravity Using Monte Carlo

JORGE ALFARO, MARCO SAN MARTIN, JOAQUIN SUREDA

2019

<https://doi.org/10.3390/universe5020051>