

Pedro Mas Buitrago

PhD in Astrophysics

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Languages: Spanish (native), English (C1 advanced), French (basic)

RESEARCH POSITIONS

Postdoctoral Researcher for ESA — CAB (INTA/CSIC)

Feb 2025 – Present

@Centro de Astrobiología (CAB-INTA/CSIC), ESAC, Madrid

Member of a European Space Agency project focused on the application of deep learning methods (Zoobot) to the *Euclid* large-scale dataset. Leading a *Euclid* project on the effects of environment on detailed visual galaxy morphologies in clusters. Member of the *Euclid* team building the *Euclid* DR1 visual morphology catalogue. Creation and exploitation of galaxy morphology catalogues for the scientific community. Member of the Euclid Consortium.

Predoctoral Researcher — INTA

Feb 2021 – Feb 2025

@Instituto Nacional de Técnica Aeroespacial (INTA), Madrid

Development of deep transfer learning techniques for atmospheric parameter estimation from high-resolution and low-resolution spectroscopic data. Exploitation of large astronomical surveys (J-PLUS, CARMENES, *Euclid*) using machine learning and Virtual Observatory tools.

EDUCATION

PhD in Astrophysics

2021 – 2025

@Universidad Complutense de Madrid (UCM)

PhD Thesis: “Virtual Observatory and machine learning for the study of low-mass objects in photometric and spectroscopic surveys.”

Research Stay — Collaboration with Dr. Adam Burgasser and Dr. Chris Theissen

Sep 2024 – Dec 2024

@University of California San Diego (UCSD)

Adaptation of deep transfer learning methodology developed during the PhD to low-resolution spectra for automatic identification and atmospheric parameter characterisation.

MSc in Astrophysics

2018 – 2019

Universidad Complutense de Madrid (UCM). Grade: 8.72/10.

Final project: “Estimation of the parameters of galaxy luminosity functions using Bayesian methods.”

BSc in Physics

2014 – 2018

Universidad Complutense de Madrid (UCM). Grade: 7.57/10.

Erasmus+ at the Kapteyn Astronomical Institute of the Rijksuniversiteit Groningen, 2017–2018. Astrophysics specialisation.

PUBLICATIONS

First-author and lead publications:

1. **Mas-Buitrago, P.**, et al. (150+ co-authors from the Euclid Collaboration), submitted to A&A — *Euclid: Quick Data Release (Q1). Exploring the detailed visual morphology of galaxies in clusters.*
2. **Mas-Buitrago, P.**, Zhang, J.-Y., Solano, E., et al. 2025, A&A, 695, A182 — *Ca II and H α flaring M dwarfs detected with multi-filter photometry*
3. **Mas-Buitrago, P.**, González-Marcos, A., Solano, E., et al. 2024, A&A, 687, A205 — *Using autoencoders and deep transfer learning to determine the stellar parameters of 286 CARMENES M dwarfs*
4. **Mas-Buitrago, P.**, Solano, E., González-Marcos, A., et al. 2022, A&A, 666, A147 — *J-PLUS: Discovery and characterisation of ultracool dwarfs using Virtual Observatory tools. II. Second data release and machine learning methodology*

Contributing author:

5. Euclid Collaboration: Žerjal M., Dominguez-Tagle C., ... **Mas-Buitrago, P.**, et al., 2026, A&A, 711, A37
6. Irureta-Goyena B. Y., Altieri B., ... **Mas-Buitrago, P.**, et al., 2026, A&A, 710, A27.
7. Dominguez-Tagle, C., Žerjal, M., ... **Mas-Buitrago, P.**, et al. 2025, ApJ, 991, 84
8. Aguilar J. F., Cruz P., ... **Mas-Buitrago P.**, et al., submitted to A&A.
9. Martín, E. L., Žerjal, M., ... **Mas-Buitrago, P.**, et al. 2025, A&A, 697, A7
10. Rodrigo, C., Cruz, P., ... **Mas-Buitrago, P.**, et al. 2024, A&A, 689, A93

SURVEY MEMBERSHIPS & COLLABORATIONS

- **Euclid Consortium** — Active member of the Galaxy & AGN Evolution science working group. Contributor to ERO and Q1 Euclid science.
- **CARMENES** — Consortium member. Provided the atmospheric parameter estimations of 286 CARMENES stars, using a deep transfer learning methodology.
- **J-PLUS** — Consortium member. Led a search for low-mass objects with machine learning techniques using J-PLUS DR2 multi-filter photometry, identifying 7 829 new objects.

CONFERENCE PRESENTATIONS & SEMINARS

1. **Contributed talk**, Machine Learning Meets Galaxy Classification conference, European Space Agency, Spain, 06/2026. *“Euclid & Zoobot: Detailed Visual Galaxy Morphology in Clusters”*.
2. **Invited seminar**, CosmoStat, DAp-AIM CEA Paris-Saclay, France, 04/2026. *“Euclid & Zoobot: Detailed Visual Galaxy Morphology in Clusters”*.
3. **Invited seminar**, Institut Astrophysique de Paris, France, 03/2026. *“Euclid & Zoobot: Detailed Visual Galaxy Morphology in Clusters”*.
4. **Contributed talk**, 18th SCI Science Workshop, European Space Agency, La Granja, Spain, 02/2026. *“Euclid & HST: Detailed Galaxy Morphology in Clusters”*.
5. **Contributed talk**, Working with Euclid Q1: From Data Access to Science, European Space Agency, Spain, 12/2025. *“Detailed Galaxy Morphology in Clusters in Euclid Q1”*.
6. **Invited seminar**, Galaxy Zoo Collaboration, remote, 10/2025. *“Euclid & Galaxy Zoo: Detailed Galaxy Morphology in Clusters”*.
7. **Invited seminar**, European Space Agency (ESAC), Madrid, Spain, 07/2025. *“Deep Transfer Learning for the Analysis of Spectroscopic Data”*.
8. **Invited seminar**, Centro de Astrobiología, Madrid, Spain, 01/2025. *“Deep Transfer Learning for the Analysis of Spectroscopic Data”*.
9. **Invited seminar**, Astronomy Department, University of California San Diego, USA, 10/2024. *“Deep Transfer Learning for the Analysis of Spectroscopic Data”*.
10. **Contributed talk**, XVI Scientific Meeting of the Spanish Society of Astronomy (SEA), Granada, Spain, 07/2024. *“Using autoencoders and deep transfer learning to determine the stellar parameters of CARMENES M dwarfs.”*
11. **Contributed talk**, 19th CARMENES Scientific Meeting, remote, 02/2024. *“Using autoencoders and deep transfer learning to determine the stellar parameters of CARMENES M dwarfs.”*
12. **Contributed talk**, 16th SCI Science Workshop, European Space Agency, Aranjuez, Spain, 01/2024. *“Using autoencoders and deep transfer learning to determine the stellar parameters of CARMENES M dwarfs.”*
13. **Contributed talk**, XVIII J-PAS Collaboration Meeting, remote, 12/2022. *“Identification of ultracool dwarfs in J-PLUS DR2 using Virtual Observatory tools and machine learning techniques.”*
14. **Contributed talk**, “Keep you uPhDated day” workshop, Centro de Astrobiología, Madrid, Spain, 12/2022. *“Identification of ultracool dwarfs in J-PLUS DR2 using Virtual Observatory tools and machine learning techniques.”*
15. **Contributed talk**, XV Scientific Meeting of the Spanish Society of Astronomy (SEA), Tenerife, Spain, 09/2022. *“Remote Virtual Observatory schools.”*

TEACHING & OUTREACH

Teaching and training

- **Tutor and co-organiser** at multiple national and international schools organised by the Spanish Virtual Observatory.
- **Co-organiser** of PyCoffees (github.com/PyCoffees/notebooks), lunch talks on Python for research at Centro de Astrobiología, Madrid.

Scientific community service

- **Member of the Space Science Faculty**, European Space Agency.
- **Co-organiser**, Special Session “20 years of science with the Virtual Observatory: a story of success”, XVI Scientific Meeting of the Spanish Society of Astronomy, Granada, Spain, 07/2024.
- **Local Organising Committee**, “.Astronomy 13” Conference, European Space Agency (ESAC campus), Madrid, Spain, 04/2024.
- **Co-organiser**, Special Session “Science with the Virtual Observatory: status, success cases, the future”, European Astronomical Society Annual Meeting, Kraków, Poland, 07/2023.

Outreach

- **Public talks on artificial intelligence in astronomy** for high-school students.

GRANTS & FELLOWSHIPS

- **FPI Predoctoral grant**, Instituto Nacional de Técnica Aeroespacial, 2021–2025.

TECHNICAL SKILLS

Programming & ML	Python, TensorFlow/Keras, PyTorch, Scikit-learn, R, deep learning, foundation models, LLMs/RAG, AI agents
Data & Visualisation	SQL, ADQL/TAP, Matplotlib, Plotly, Streamlit, Qlik Sense
Platforms & Tools	Git, Jupyter, VS Code, ESA Datalabs, Google Cloud, VO tools (TOPCAT, Aladin, VOSA)

OTHER PROFESSIONAL EXPERIENCE

Business Intelligence Teacher — Cámara de Comercio de Madrid	Jan 2022 – Feb 2024
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Teaching the advanced Course “Big Data for Business Intelligence” (data modelling).

Qlik Sense Developer — Cognizant Technology Solutions	Feb 2020 – Feb 2021
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Dashboard development and data modelling for international clients in the pharmaceutical supply chain.

Business & Data Analyst Intern — Amazon ES	Jun 2019 – Oct 2019
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Data extraction, reporting, and deal scheduling for third-party Sellers in the Amazon ES Marketplace.