

# PABLO VILLANUEVA DOMINGO

## PHD IN PHYSICS & DATA SCIENTIST

I recently obtained my **PhD in theoretical physics** at the University of València. During my research, I have led international collaborations, publishing scientific articles and presenting the results in multiple seminars. I have focused on employing **data analysis** and **deep learning** techniques in cosmology and astrophysics, such as Convolutional Neural Networks and Graph Neural Networks, which now I aim to apply in industry.

## CONTACT

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## SKILLS

### 💻 Computation

#### Programming languages

Python, C, C++, C#, Fortran, SQL,  
HTML/CSS, Javascript

#### General software

Mathematica, LaTeX, MATLAB, Unity

#### Visualization

Matplotlib, plotly, gnuplot

#### Data analysis

Numpy, scipy, pandas, networkx

#### Data scraping

Beautiful Soup, tweepy

### 🤖 Machine learning

#### Packages

PyTorch, Tensorflow/Keras,  
PyTorch Geometric, Scikit-learn

#### Neural Nets experience

Convolutional Neural Nets (CNNs), U-Nets,  
Generative Adversarial Nets (GANs), Graph  
Neural Nets (GNNs), Long short-term  
memory (LSTM)

#### Fields

Computer vision, Natural Language  
Processing, Reinforcement Learning

#### See my work in Machine Learning at

<https://pablovd.github.io/codes>

### 💬 Soft skills

#### Communication

Public speaking, writing skills

#### Project management

Collaboration, teamwork, initiative,  
organization

#### Problem solving

Logical reasoning, lateral thinking,  
creativity

### 🗣️ Languages

Spanish	Mother tongue
Catalan	Mother tongue
English	Fluent
Portuguese	Basics

## 👜 WORK HISTORY

### • Research assistant

📅 Jun. 2021- Dec. 2021 | 📍 Instituto de Física Corpuscular

*Técnico superior de apoyo a la investigación, CIDEAGENT/2018/019, CPI-21-108*

### • PhD fellowship

📅 May 2017 - Mar. 2021 | 📍 Instituto de Física Corpuscular - Universitat de València

*FPI Severo Ochoa, Ref. SEV-2014-0398-16-3*

### • PhD contract

📅 Oct 2016 - May 2017 | 📍 Instituto de Física Corpuscular

*Sabor y origen de la materia (SOM), PROMETEU CPI-16-242*

### • Research introduction fellowship

📅 May-Oct. 2016 | 📍 Instituto de Física Corpuscular

*Iniciación a la investigación Severo Ochoa*

## 🎓 EDUCATION

### • PhD in Physics, *cum laude*

📅 2016-2021 | 📍 Instituto de Física Corpuscular - Universitat de València

### • Master in Advanced Physics

📅 2015-2016 | 📍 Universitat de València

### • Bachelor of Physics

📅 2011-2015 | 📍 Universitat de València

As well as multiple schools and courses in data science, machine learning, computational tools and physics, which can be found at <https://pablovd.github.io/talks.pdf>

## ✈️ RESEARCH STAYS

I have led several international research collaborations, visiting universities from different countries:

📅 Nov.- Dec. 2019 | 📍 3 weeks at Service de Physique Théorique, Université Libre de Bruxelles, Brussels, Belgium.

📅 Sep.- Oct. 2019 | 📍 1 month at Department of Astrophysical Sciences, Princeton University, New Jersey, USA.

📅 Sep.- Nov. 2018 | 📍 2 months at Kavli IPMU, University of Tokyo, Japan, within the project *RISE InvisiblesPlus(69057-InvisiblesPlus-H2020-MSCA-RISE)*.

📅 Jun.- Jul. 2018 | 📍 1 month at Institut de Ciències del Cosmos - Universitat de Barcelona (ICCUB).

📅 Apr.- May. 2018 | 📍 1 month at Institut de Ciències del Cosmos - Universitat de Barcelona (ICCUB).

📅 Jun.- Aug. 2017 | 📍 2 months at Fermi National Accelerator Laboratory (Fermilab), Illinois, USA, within the project *RISE InvisiblesPlus(69057-InvisiblesPlus-H2020-MSCA-RISE)*.

## AWARDS

📅 Dec. 2016 | 1st prize, in collaboration with Jaime Bautista Navío, in the XXVII edición del Premio Rotary al Fomento del Trabajo Experimental en Física, awarded by the Rotary Club Valencia-Centro.

## TALKS

I have given **7 seminars** at the universities of Princeton (USA), Tokyo, Nagoya (Japan), Brussels and València; as well as **7 talks** in conferences, meetings and schools.

A complete list can be found at <https://pablovd.github.io/talks.pdf> These are some of my last talks:

- *Machine Learning at galactic and cosmological scales*

📅 Nov. 17 2021 | 📍 Instituto de Física Corpuscular | [Video and slides](#)

- *Weighing the Milky Way and Andromeda with Graph Neural Networks*

📅 Nov. 4 2021 | 📍 CAMELS meeting, online, organized by the Center for Computational Astrophysics, Flatiron Institute, New York

- *Constraining Primordial Black Hole scenarios with 21 cm cosmology*

📅 Oct. 14 2019 | 📍 Department of Astrophysical Sciences, Princeton University, USA

## SELECTED PUBLICATIONS

I have published **14 scientific articles** in high impact journals based on my research on cosmology and astrophysics. The full list of publications can be found in my INSPIRE profile [P.Villanueva.Domingo.1](#). Among them, I have applied deep learning methods in the following works:

- *Weighing the Milky Way and Andromeda with Artificial Intelligence*

**Pablo Villanueva-Domingo**, Francisco Villaescusa-Navarro, Shy Genel, Daniel Anglés-Alcázar, Lars Hernquist, Federico Marinacci, Mark Vogelsberger and Desika Narayanan

📅 Nov. 2021 | 📖 [2111.xxxxx](#)

- *Inferring halo masses with Graph Neural Networks*

**Pablo Villanueva-Domingo**, Francisco Villaescusa-Navarro, Daniel Anglés-Alcázar, Shy Genel, Federico Marinacci, David N. Spergel, Lars Hernquist, Mark Vogelsberger, Romeel Dave and Desika Narayanan

📅 Nov. 2021 | 📖 [2111.08683](#)

- *Removing Astrophysics in 21 cm maps with Neural Networks*

**Pablo Villanueva-Domingo** and Francisco Villaescusa-Navarro

📅 Jan. 2021 | 📖 [The Astrophysical Journal, 907\(1\):44, 2021; 2006.14305](#)

## OUTREACH & ADDITIONAL WORK EXPERIENCE

📅 Feb. 2021 | [Outreach video](#) about the astronomer Sandra M. Faber within the proyect *Pioneras - Recordando a Lise Meitner*.

📅 2020 - Now | Journal referee for Monthly Notices of the Royal Astronomical Society (MNRAS).

📅 Jun. 2019 | Member of the local organizing committee of the Invisibles19 Workshop at València and Invisibles19 School at Laboratorio subterráneo de Canfranc (LSC)

📅 2016-2017 | Collaboration in the organization of the outreach event *Feria-Concurso Experimenta*, València.

## REFERENCES

- Dr. Olga Mena Requejo

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- Dr. Francisco Villaescusa Navarro

🏠 Center for Computational Astrophysics, Flatiron Institute, New York | ✉ [villaescusa.francisco@gmail.com](mailto:villaescusa.francisco@gmail.com)

- Dr. Sergio Palomares Ruiz

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- Dr. Laura Lopez Honorez

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