Pablo Villanueva Domingo

Personal data

Present position	PhD student at Instituto de Física Corpuscular (IFIC) - Universitat de València (UV). Parc Científic, C/ Catedrático José Beltrán, 2. Paterna, 46980; Spain.
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Webpage	https://PabloVD.github.io/
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Research interests	Cosmology, Dark Matter, 21 cm cosmology, Reionization, Primordial Black Holes, Large scale structure, CMB, Big Bang Nucleoshyntesis, Astroparticles, Neutrinos, Machine Learning, Deep learning.

Education

2016-2020 **PhD in Physics**,
Instituto de Física Corpuscular (IFIC) - Universitat de València (UV).
PhD project: *Dark Matter and 21 cm Cosmology.*
Advisors: Olga Mena Requejo, Sergio Palomares Ruiz..

2015–2016 **Master in Advanced Physics**, Speciality in theoretical physics.
Universitat de València (UV).
Master thesis: *21 cm Cosmology, Warm Dark Matter and Reionization.*
Advisor: Olga Mena Requejo.

2011–2015 **Bachelor of Physics**,
Universitat de València (UV).
Bachelor thesis: *Non-standard cosmology: relativistic species in the early universe.*
Advisor: Olga Mena Requejo.

Fellowships & awards

2017-2020 PhD fellowship *Ayuda para contrato predoctoral para la formación de doctores (FPI), Ref. SEV-2014-0398-16-3* . Instituto de Física Corpuscular (IFIC). Advisors: Olga Mena Requejo, Sergio Palomares Ruiz.

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. Advisor: Vicent J. Martínez.
Title of the work: *Medida del brillo superficial límite con corrientes de marea.*

2016-2017 PhD contract *Sabor y origen de la materia (SOM).CPI-16-242. PROMETEU per a grups d'investigació d'Excel·lència de la Conselleria d'Educació, Cultura i Esport. CPI-16-242* . Instituto de Física Corpuscular (IFIC). Advisors: Olga Mena Requejo, Sergio Palomares Ruiz.

2016 Research introduction fellowship *Iniciación a la investigación Severo Ochoa.* Instituto de Física Corpuscular (IFIC). Advisor: Olga Mena Requejo.

Seminars

Dec. 6 2019   *Constraining Dark Matter scenarios through 21 cm cosmology*. Université Libre de Bruxelles, Brussels, Belgium.

Oct. 14 2019   *Constraining Primordial Black Hole scenarios with 21 cm cosmology*. Department of Astrophysical Sciences, Princeton University, USA.

May 6 2019   *Exploring Dark Matter scenarios through 21 cm Cosmology*. Instituto de Física Corpuscular (IFIC).

Dec. 7 2018   *Constraints on Dark Matter scenarios through 21 cm Cosmology*. Instituto de Física Corpuscular (IFIC).

Oct. 25 2018   *Constraining astrophysical and Dark Matter scenarios with EDGES and Reionization data*. University of Nagoya, Japan.

Oct. 23 2018   *Constraining astrophysical and Dark Matter scenarios with EDGES and Reionization data*. Kavli IPMU, University of Tokyo, Japan.

Conferences & workshops

Jun. 2019   *Invisibles19 Workshop*. Jardí Botànic de la UV, València. **Member of the local organizing committee.**
• **Talk and poster:** *Local 21 cm signal from Primordial Black Holes.*

Mar. 2019   Symposium *Data science symposium, bridging fundamental research and industry*. Universidade do Minho, Braga, Portugal.

Sep. 2018   *IGM 2018: Revealing Cosmology and Reionization history with the Intergalactic Medium*. Kavli IPMU, University of Tokyo, Japan.

May 2018   *Statistical Challenges in 21st Century Cosmology*. Universitat de València (UV).

Nov. 2017   *Physics opportunities with a new universe's view: the SKA radio telescope*. Instituto de Física Corpuscular (IFIC).
• **Talk:** *Warm dark matter and cosmic reionization.*

Sep. 2017   *Meeting on Fundamental Cosmology*. Centro de Estudios de Física del Cosmos de Aragón (CEFCA).
• **Talk:** *Warm dark matter and the ionization history of the Universe.*

Apr. 2017   *IberiCOS 2017*. Universitat de València (UV).

May 2016   *Planck 2016*. Universitat de València (UV).

Courses & schools

Jun. 2019   *Invisibles19 School*. Laboratorio subterráneo de Canfranc (LSC). **Member of the local organizing committee.**
• **Poster:** *Local 21 cm signal from Primordial Black Holes.*

Mar. 2019   School *Data science in (astro)particle physics and cosmology: the bridge to industry*. Universidade do Minho, Braga, Portugal.

Jan. 2019   Course *Effective Field Theory*. Instituto de Física Corpuscular (IFIC).

Jun. 2018   School *Cosmological Applications from First Stars, Reionization and 21-cm Observations*. Institut de Ciències del Cosmos Universitat de Barcelona (ICCUB).
• **Talk and poster:** *EDGES result versus CMB and low-redshift constraints on ionization histories.*

May 2018   School *8th IDPASC School*. Instituto de Física Corpuscular (IFIC).

May 2018	School *Astronomical Data Analysis school ADA IX*. Universitat de València (UV).
Mar. 2018	Course *Anomalies in Quantum Field theory*. Instituto de Física Corpuscular (IFIC).
Feb. 2018	Course *Theories of modified gravity*. Universitat de València (UV).
Jan. 2018	Course *Constrained Hamiltonian systems*. Universitat de València (UV).
Oct. 2017	School *Hot topics in cosmology*. Institut de Ciències del Cosmos - Universitat de Barcelona (ICCUB).
Sep.-Dec. 2017	Course *Group theory*. Universitat de València (UV).
May 2017	Course *Computer tools in particle physics*. Instituto de Física Corpuscular (IFIC).
Apr. 2017	Course *From QFT to holography and back*. Instituto de Física Corpuscular (IFIC).
Mar. 2017	Course *Overview of Astrophysical Gas Dynamics and Numerical Simulations*. Institut de Ciències del Cosmos - Universitat de Barcelona (ICCUB).
Mar. 2017	School *The IFT School on Cosmology Tools*. Instituto de Física Teórica (IFT).
Feb. 2017	Course *Data analysis and machine learning -Phyton-*. Universitat de València (UV).
Oct. 2016	Course *Transiciones de Fase y Fenómenos Críticos - Superconductividad*. Universitat de València (UV).
May 2016	Course *Scientific Python*. Instituto de Física Corpuscular (IFIC).
Apr. 2016	Course *Black holes in general relativity and beyond*. Universitat de València (UV).
Feb. 2013	Course *Asymptotic methods*. Universitat de València (UV).

Research stays

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), Barcelona, Spain.
Apr.- May. 2018	1 month at Institut de Ciències del Cosmos - Universitat de Barcelona (ICCUB), Barcelona, Spain.
Jun.- Aug. 2017	2 months at Fermi National Accelerator Laboratory (Fermilab), Illinois, USA, within the project *RISE InvisiblesPlus(69057–InvisiblesPlus–H2020–MSCA–RISE)*.

Additional work experience

Apr. 2017	Collaboration in the organization of the scientific dissemination event *Feria-Concurso Experimenta*. València.
May 2016	Collaboration in the organization of the scientific dissemination event *Feria-Concurso Experimenta*. València.
Apr. - May 2016	Research work: *Baryonic acoustic oscillations and wavelets*. Observatorio Astronómico de la Universitat de València (OAUV). Advisors: Vicent J. Martínez, Pablo Arnalte Mur.
Feb. - Jun. 2015	Introduction to research work: *Light nuclei in Big Bang Nucleosynthesis*. Instituto de Física Corpuscular (IFIC). Advisor: Olga Mena Requejo.

2013	Teacher of private math and physics lessons.

Other skills

Computation

Programming languages	Python (NumPy, SciPy, Matplotlib, Pytorch, Scikit-learn, pandas), Fortran, C, C++, SQL, HTML.
General software	Mathematica, LaTeX, Gnuplot, MATLAB.
Cosmological software	CLASS, CAMB, 21cmFAST, Recfast, CosmoRec, Ares.

Languages

Spanish	Mother tongue
Catalan	Mother tongue
English	Fluent
Portuguese	Basics

Publications

Jun. 2020	Pablo Villanueva-Domingo and Francisco Villaescusa-Navarro. *Removing Astrophysics in 21 cm maps with Neural Networks.* arXiv:2006.14305 (submitted to *MNRAS*)
Apr. 2020	Pablo Villanueva-Domingo, Olga Mena and Jordi Miralda-Escudé. *Maximum amplitude of the high-redshift 21-cm absorption feature.* Phys. Rev. D101(8):083502, 2020.
Aug. 2019	Olga Mena, Sergio Palomares-Ruiz, Pablo Villanueva-Domingo, and Samuel J. Witte. *Constraining the primordial black hole abundance with 21-cm cosmology.* Phys. Rev., D100(4):043540, 2019.
Jan. 2019	Laura Lopez-Honorez, Olga Mena and Pablo Villanueva-Domingo. *Dark Matter microphysics and 21 cm observations.* Phys. Rev., D99(2):023522, 2019.
Jun. 2018	Miguel Escudero, Laura Lopez-Honorez, Olga Mena, Sergio Palomares-Ruiz and Pablo Villanueva-Domingo. *A fresh look into the interacting dark matter scenario.* JCAP, 1806(06):007, 2018.
May 2018	Samuel Witte, Pablo Villanueva-Domingo, Stefano Gariazzo, Olga Mena and Sergio Palomares-Ruiz. *EDGES result versus CMB and low-redshift constraints on ionization histories.* Phys. Rev., D97(10):103533, 2018.
Apr. 2018	Pablo Villanueva-Domingo, Stefano Gariazzo, Nickolay Y. Gnedin and Olga Mena. *Was there an early reionization component in our universe?* JCAP, 1804(04):024, 2018.
Jan. 2018	Pablo Villanueva-Domingo, Nickolay Y. Gnedin, and Olga Mena. *Warm Dark Matter and Cosmic Reionization.* Astrophys. J., 852(2):139, 2018

Nov. 2017   Laura Lopez-Honorez, Olga Mena, Sergio Palomares-Ruiz and Pablo Villanueva-Domingo.
Warm dark matter and the ionization history of the Universe.
Phys. Rev., D96(10):103539, 2017.

References

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