

## CURRICULUM VITAE

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### (1) Personal Data

**Name:** Francisco Villaescusa-Navarro  
**Title:** Ph.D. in physics.  
**Born:** 7 August 1984, Albacete, Spain  
**Nationality:** Spanish  
**Work address:** Osservatorio Astronomico di Trieste  
Via G.B. Tiepolo 11, 34143, Trieste, Italy  
**Email:** villaescusa@oats.inaf.it  
**Web Page:** <http://adlibitum.oats.inaf.it/villaescusa/>  
**Phone (daytime):** [+39] 0403199235  
**Present Employment:** CosmolGM postdoctoral fellow  
INAF-OATS, Trieste, Italy

### (2) Brief CV

#### Education

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**Jul. 08 - May. 12** Ph.D. in Physics, Valencia University, Spain.  
**Sep. 07 - Jul. 08** Master in advanced physics, Valencia University, Spain.  
**Sep. 02 - Jul. 07** Bachelor's Degree in Physics, Valencia University, Spain.  
Granted with Excellence Prize in 2007

## Academic and Professional Positions

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| <b>Sep. 16 - present</b> | Center for Computational Astrophysics fellow. (New York, USA).<br>Supervisor: Prof. David Spergel   |
| <b>Jul. 12 - Aug. 16</b> | CosmoIGM postdoctoral fellow. (Trieste, Italy).<br>Supervisor: Dr. Matteo Viel  |
| <b>Jan. 08 - Jun. 12</b> | Ph.D. student. JAE predoctoral fellow. (Valencia, Spain).<br>Supervisor: Dr. Carlos Peña-Garay  |
| <b>Jul. 10 - Aug 11</b>  | Visiting Graduate Student at Institute for Theory and Computation,<br>Harvard-Smithsonian center for Astrophysics (Cambridge, USA).<br>Supervisor: Prof. Abraham Loeb   |
| <b>Sep. 09 - Dec 09</b>  | Visiting Graduate Student at Canadian Institute for Theoretical<br>Astrophysics (Toronto, Canada).<br>Supervisor: Prof. Neal Dalal                                      |
| <b>Sep. 07 - Dec. 07</b> | Research Collaborator of the CSIC,<br>Consejo Superior de Investigaciones Cientificas, IFIC, Valencia.<br>Supervisors: Prof. Jose Navarro-Salas & Dr. Carlos Peña-Garay |
| <b>Jan. 07 - Jun. 07</b> | Research Collaborator for the Spanish Department of Education<br>and Science, Valencia, Spain.  |
| <b>Aug. 06 - Sep. 06</b> | Summer training in Kaon experiment (Mainz, Germany).<br>Supervisors: Dr. Salvador Sanchez & Prof. Patrick-Achenbach   |

## Major Fields of Research

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| <b>Cosmology &amp; Astrophysics</b> | Massive neutrinos cosmology.<br>The Large Scale Structure of the Universe.<br>21cm cosmology.<br>Galaxy formation and evolution.<br>The InterGalactic Medium.<br>Modified gravity. |
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## Computational skills

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| <b>Systems</b>            | Mac, Linux, Windows.   |
| <b>Programming</b>        | Fortran, C/C++, IDL, MPI, OpenMP, bash.<br>Python: numpy, scipy, mpi4py, weave, PyCUDA, Cython |
| <b>Plotting</b>           | GNUPlot, matplotlib.   |
| <b>Cosmological Codes</b> | CAMB, GADGET, N-GenIC.   |

## Professional activities

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| <b>Referee</b> | Monthly Notices of the Royal Astronomical Society.<br>Physical Review D<br>Physical Review Letters<br>Journal of Cosmology and Astroparticle physics<br>The Astrophysical Journal<br>The American Astronomical Society Journal<br>Nature |
| <b>Euclid</b>  | Member of OU-LE3 Galaxy clustering validation WP   |

## Student supervision

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|---------------------|--|
| <b>2013-present</b> | Elena Massara (SISSA graduate student).    |
| <b>2014-present</b> | Isabella Carucci (SISSA graduate student). |
| <b>2015-present</b> | Andrej Obuljen (SISSA graduate student).   |

## (3) Talks

1. 12/July/2016: "**Impact of neutrino masses on the Universe LSS**", Theoretical challenges for precision galaxy clustering workshop, Sesto, Italy.
2. 04/July/2016: "**Precision cosmology with radial BAO from intensity mapping**", BAO & RSD: dark light on obscure acronyms workshop, Sesto, Italy.
3. 22/June/2016: "**Impact of neutrino masses on the large-scale structure of the Universe**", Neutrino and light particles in cosmology workshop, Berkeley, USA.
4. 07/June/2016: "**Massive neutrino signatures on the large-scale structure of the Universe**", Lunch seminar, IPMU, Tokyo, Japan.
5. 31/May/2016: "**Cosmological constraints on neutrino properties**", PhyStat- $\nu$  workshop, IPMU, Tokyo, Japan.
6. 24/Feb/2016: "**Massive neutrino signatures on the large-scale structure of the Universe**", Cosmology seminar, Helsinki, Finland.
7. 11/Feb/2016: "**Cosmology and astrophysics with cosmic neutral hydrogen**", From galaxies to the cosmic web workshop, Pune, India.
8. 21/Dec/2015: "**21cm cosmology**", La trobada, IFIC, Valencia, Spain.
9. 15/Dec/2015: "**Massive neutrinos and their effect on the large-scale structure of the Universe**", 28th Texas Symposium on Relativistic Astrophysics, Geneva, Switzerland.
10. 12/Nov/2015: "**Massive neutrino signatures on the large-scale structure of the Universe**", CCAPP, Columbus, Ohio, USA.
11. 10/Nov/2015: "**Massive neutrino signatures on the large-scale structure of the Universe**", Caltech, Pasadena, California, USA.
12. 6/Nov/2015: "**Massive neutrino signatures on the large-scale structure of the Universe**", LBNL, Berkeley, California, USA.

13. 2/Nov/2015: "**Massive neutrino signatures on the large-scale structure of the Universe**", Fermilab, Batavia, Illinois, USA.
14. 18/Sep/2015: "**Massive neutrinos and their effect on the large scale structure of the Universe**", Cosmology and particle physics seminar, Geneva, Switzerland.
15. 31/Aug/2015: "**Precision cosmology with 21cm intensity mapping in the post-reionization epoch**", From inflation to galaxies workshop, Castiglioncello, Italy.
16. 7/Jul/2015: "**Weighing neutrinos with cosmology**", Galaxy Clustering within Euclid OULE3 workshop, Sesto, Italy.
17. 18/May/2015: "**Modeling the neutral hydrogen distribution in the post-reionization Universe**", The Olympian Symposium 2015, Paralia Katerini, Greece.
18. 13/May/2015: "**Precision cosmology with 21cm intensity mapping in the post-reionization era**", Advanced Workshop on Cosmological Structures from Reionization to Galaxies: Combining Efforts from Analytical and Numerical Methods, ICTP, Trieste, Italy.
19. 18/February/2015: "**21cm cosmology: modeling the neutral hydrogen distribution in the post-reionization era**", Brera astronomical observatory, Merate, Milan, Italy.
20. 3/February/2015: "**Cosmology with neutral hydrogen**", 5th Hydrosim meeting, Trieste, Italy.
21. 16/January/2015: "**The impact of massive neutrinos on the large scale structure of the Universe**", Beyond  $\Lambda$ CDM conference, Oslo, Norway.
22. 8/December/2014: "**Report on validation GC**", Euclid meeting, Paris, France.
23. 10/September/2014: "**Small scale structures and neutrino masses**", Neutrino Oscillation Workshop, Conca Specchiulla, Otranto, Lecce, Italy.
24. 20/August/2014: "**Modeling the distribution of neutral hydrogen in the high redshift universe: intensity mapping**", Workshop on Cosmology from Baryons at High Redshift, ICTP, Trieste, Italy.
25. 27/June/2014: "**Modeling the distribution of neutral hydrogen in the high redshift universe: intensity mapping**", Arecibo Observatory, Arecibo, Puerto Rico, USA.
26. 10/January/2014: "**Impact of massive neutrinos on the large scale structure of the universe**", La Trobada, IFIC, Valencia, Spain.
27. 14/October/2013: "**Impact of massive neutrinos on the clustering properties of dark matter halos and galaxies**", Dark side of the universe: IX international workshop, SISSA, Trieste, Italy.
28. 11/October/2013: "**Clustering properties in cosmologies with massive neutrinos**", Workshop on Galaxy Bias, ICTP, Trieste, Italy.
29. 24/September/2013: "**The impact of massive neutrinos on the halo bias**", 4rd Hydrosim Meeting, Trieste, Italy.
30. 11/January/2013: "**Neutrino simulations**", 3rd Hydrosim Meeting, Trieste, Italy.
31. 4/December/2012: "**The Non-linear evolution of the neutrino cosmic background**", ICTP seminar, Trieste, Italy.
32. 18/April/2012: "**The impact of neutrino masses on cosmology**", OATS seminar, Trieste, Italy.
33. 27/January/2011: "**The effect of neutrinos in cosmological voids**", Cosmole meeting, Valencia, Spain.

34. 4/February/2010: "**Cores in warm dark matter models**", Valencia, Spain.
35. 8/April/2009: "**Gravitational clustering of neutrinos in galaxy clusters**", Valencia, Spain.
36. 25/September/2006: "**Progress on K1 experiment**", Mainz, Germany.

#### **(4) Referees**

- 1) **Prof. Stefano Borgani**. Osservatorio Astronomico di Trieste.  
Trieste, Italy (borgani@oats.inaf.it)
- 2) **Prof. Neal Dalal**. University of Illinois at Urbana-Champaign,  
Urbana, IL, USA (dalal@illinois.edu)
- 3) **Prof. Abraham Loeb**. Institute for Theory and Computation,  
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA  
(aloeb@cfa.harvard.edu)
- 4) **Dr. Carlos Peña-Garay**. Instituto de Física Corpuscular.  
Valencia, Spain (penya@ific.uv.es)
- 5) **Dr. Emiliano Sefusatti**. Osservatorio Astronomico di Brera.  
Brera, Milan, Italy (emiliano.sefusatti@brera.inaf.it)
- 6) **Dr. Matteo Viel**. Osservatorio Astronomico di Trieste.  
Trieste, Italy (viel@oats.inaf.it)

## PUBLICATIONS

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1. **Initial Conditions for Accurate N-Body Simulations of Massive Neutrino Cosmologies**  
Matteo Zennaro, Julien Bel, [Francisco Villaescusa-Navarro](#), Carmelita Carbone, Emiliano Sefusatti, Luigi Guzzo  
May 2016, 15 pp. [e-Print Archive: astro-ph/1605.05283]  
Submitted to MNRAS
2. **Simulating cosmologies beyond  $\Lambda$ CDM with PINOCCHIO**  
Luca A. Rizzo, [Francisco Villaescusa-Navarro](#), Pierluigi Monaco, Emiliano Munari, Stefano Borgani, Emanuele Castorina, Emiliano Sefusatti  
February 2016, 23 pp.  
Submitted to JCAP
3. **Neutral hydrogen in galaxy clusters: impact of AGN feedback and implications for intensity mapping**  
[Francisco Villaescusa-Navarro](#), Susana Planelles, Stefano Borgani, Matteo Viel, Elena Rasia, Giuseppe Murante, Klaus Dolag, Lisa K. Steinborn, Veronica Biffi, Alexander M. Beck, Cinthia Ragone-Figueroa  
October 2015, 19 pp. [e-Print Archive: astro-ph/1510.04277]  
Published on MNRAS, 456, 3553, (2016)
4. **Weighing neutrinos with cosmic neutral hydrogen**  
[Francisco Villaescusa-Navarro](#), Philip Bull, Matteo Viel  
July 2015, 20 pp. [e-Print Archive: astro-ph/1507.05102]  
Published on ApJ, 814, 146, (2015)
5. **Voids in massive neutrino cosmologies**  
Elena Massara, [Francisco Villaescusa-Navarro](#), Matteo Viel, Paul M. Sutter  
June 2015, 31 pp. [e-Print Archive: astro-ph/1506.03088]  
Published on JCAP, 11, 018, (2015)
6. **The effect of massive neutrinos on the BAO peak**  
By Marco Peloso, Massimo Pietroni, Matteo Viel, [Francisco Villaescusa-Navarro](#)  
May 2015, 26 pp. [e-Print Archive: astro-ph/1505.07477]  
Published on JCAP, 07, 01, (2015)
7. **Warm dark matter signatures on the 21cm power spectrum: Intensity mapping forecasts for SKA**  
Isabella P. Carucci, [Francisco Villaescusa-Navarro](#), Matteo Viel, Andrea Lapi  
February 2015, 25 pp. [e-Print Archive: astro-ph/1502.06961]  
Published on JCAP, 07, 47, (2015)
8. **Cross-correlating 21cm intensity maps with Lyman Break Galaxies in the post-reionization era**  
[Francisco Villaescusa-Navarro](#), Matteo Viel, David Alonso, Kanan K. Datta, Philip Bull, Mario G. Santos  
October 2014, 23 pp. [e-Print Archive: astro-ph/1410.7393]  
Published on JCAP, 03, 34, (2015)
9. **The halo model in a massive neutrino cosmology**  
Elena Massara, [Francisco Villaescusa-Navarro](#), Matteo Viel  
October 2014, 28 pp. [e-Print Archive: astro-ph/1410.6813]  
Published on JCAP, 12, 53, (2014)
10. **Semi-Analytic Galaxy Formation in Massive Neutrinos Cosmologies**  
Fabio Fontanot, [Francisco Villaescusa-Navarro](#), Davide Bianchi, Matteo Viel  
September 2014, 8 pp. [e-Print Archive: astro-ph/1409.6309]  
Published on MNRAS, 447, 3361, (2015)

11. **A coarse grained perturbation theory for the Large Scale Structure, with cosmology and time independence in the UV**  
Alessandro Manzotti, Marco Peloso, Massimo Pietroni, Matteo Viel, [Francisco Villaescusa-Navarro](#)  
July 2014, 37 pp. [e-Print Archive: astro-ph/1407.1342]  
Published on JCAP, 09, 47, (2014)
12. **VIDE: The Void IDentification and Examination toolkit**  
Paul M. Sutter, Guilhem Lavaux, Nico Hamaus, Alice Pisani, Benjamin D. Wandelt, Michael S. Warren, [Francisco Villaescusa-Navarro](#), Paul Zivick, Qingqing Mao, Benjamin B. Thompson  
June 2014. 9 pp. [e-Print Archive: astro-ph/1406.1191]  
Published on Astronomy & Computing, 9, 1, (2015)
13. **Modeling the neutral hydrogen distribution in the post-reionization universe: intensity mapping**  
[Francisco Villaescusa-Navarro](#), Matteo Viel, Kanan K. Datta and T. Roy Choudhury  
May 2014. 45 pp. [e-Print Archive: astro-ph/1405.6713]  
Published on JCAP, 09, 50, (2014)
14. **Constraining Warm Dark Matter with high-z supernova lensing**  
Stefania Pandolfi, Carmelo Evoli, Andrea Ferrara and [Francisco Villaescusa-Navarro](#)  
Mar 2014. 7 pp. [e-Print Archive: astro-ph/1403.2185]  
Published on MNRAS, 442, 13, (2014)
15. **Cosmic Degeneracies I: Joint N-body Simulations of Modified Gravity and Massive Neutrinos**  
Marco Baldi, [Francisco Villaescusa-Navarro](#), Matteo Viel, Ewald Puchwein, Volker Springel and Lauro Moscardini  
Nov 2013. 14 pp. [e-Print Archive: astro-ph/1311.2588]  
Published on MNRAS, 440, 75, (2014)
16. **Cosmology with massive neutrinos III: the halo mass function and an application to galaxy clusters**  
Matteo Costanzi, [Francisco Villaescusa-Navarro](#), Matteo Viel, Jun-Qing Xia, Stefano Borgani, Emanuele Castorina and Emiliano Sefusatti.  
Nov 2013. 20 pp. [e-Print Archive: astro-ph/1311.1514]  
Published on JCAP, 12, 012, (2013)
17. **Cosmology with massive neutrinos II: on the universality of the halo mass function and bias**  
Emanuele Castorina, Emiliano Sefusatti, Ravi K. Sheth, [Francisco Villaescusa-Navarro](#) and Matteo Viel.  
Nov 2013. 21 pp. [e-Print Archive: astro-ph/1311.1212]  
Published on JCAP, 02, 049, (2014)
18. **Cosmology with massive neutrinos I: towards a realistic modeling of the relation between matter, haloes and galaxies**  
[Francisco Villaescusa-Navarro](#), Federico Marulli, Matteo Viel, Enzo Branchini, Emanuele Castorina, Emiliano Sefusatti and Shun Saito.  
Nov 2013. 35 pp. [e-Print Archive: astro-ph/1311.0866]  
Published on JCAP, 03, 011, (2014)
19. **Non-linear evolution of the cosmic neutrino background**  
[Francisco Villaescusa-Navarro](#), Simeon Bird, Carlos Peña-Garay and Matteo Viel.  
Dec 2012. 24 pp. [e-Print Archive: astro-ph/1212.4855]  
Published on JCAP, 03, 019, (2013)
20. **Neutrino Signatures on the High Transmission Regions of the Lyman-alpha Forest**  
[Francisco Villaescusa-Navarro](#), Mark Vogelsberger, Matteo Viel and Abraham Loeb.  
Jun 2011. 9 pp. [e-Print Archive: astro-ph/1106.2543]  
Published on MNRAS, 431, 3670, (2013)
21. **Neutrino Halos in Clusters of Galaxies and their Weak Lensing Signature**  
[Francisco Villaescusa-Navarro](#), Jordi Miralda-Escudé, Carlos Peña-Garay and Vicent Quilis.  
Apr 2011. 13 pp. [e-Print Archive: astro-ph/1104.4770]  
Published on JCAP, 06, 027, (2011)
22. **Signatures of photon and axion-like particle mixing in the gamma-ray burst jet**  
Olga Mena, Soebur Razzaque and [Francisco Villaescusa-Navarro](#).  
Jan 2011. 16 pp. [e-Print Archive: astro-ph/1101.1903]  
Published on JCAP, 02, 030, (2011)

23. **Cores and cusps in warm dark matter halos**

Francisco Villaescusa-Navarro and Neal Dalal.

Oct 2010. 16 pp. [e-Print Archive: astro-ph/1010.3008]

Published on JCAP, 03, 024, (2011)



# CONFERENCE PROCEEDINGS AND OTHERS

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## 1. **Beyond $\Lambda$ CDM: Problems, solutions, and the road ahead**

Philip Bull, Yashar Akrami, Julian Adamek, Tessa Baker, Emilio Bellini, Jose Beltran Jimenez, Eloisa Bentivegna, Stefano Camera, Sebastien Clesse, Jonathan H. Davis, Enea Di Dio, Jonas Enander, Fabio Finelli, Alan Heavens, Lavinia Heisenberg, Bin Hu, Claudio Llinares, Roy Maartens, Edvard Mörtsell, Seshadri Nadathur, Johannes Noller, Roman Pasechnik, Marcel S. Pawlowski, Thiago S. Pereira, Miguel Quartin, Angelo Ricciardone, Signe Riemer-Sørensen, Massimiliano Rinaldi, Jeremy Sakstein, Ippocratis D. Saltas, Vincenzo Salzano, Ignacy Sawicki, Adam R. Solomon, Douglas Spolyar, Glenn D. Starkman, Daniele Steer, Ismael Tereno, Licia Verde, Francisco Villaescusa-Navarro, Mikael von Strauss, Hans A. Winther  
December 2015, 97 pp. [e-Print Archive: astro-ph/1512.05356]

## 2. **Small scales structures and neutrino masses**

Francisco Villaescusa-Navarro  
January 2015, 4 pp. [e-Print Archive: astro-ph/1501.04546]  
Published on Nuclear and Particle Physics Proceedings, 56, 2015

## 3. **Cosmology with a SKA HI intensity mapping survey**

Mario G. Santos, Philip Bull, David Alonso, Stefano Camera, Pedro G. Ferreira, Gianni Bernardi, Roy Maartens, Matteo Viel, Francisco Villaescusa-Navarro, Filipe B. Abdalla, Matt Jarvis, R. Benton Metcalf, A. Pourtsidou, Laura Wolz  
January 2015, 27 pp. [e-Print Archive: astro-ph/1501.03989]  
Published on Proceedings of Advancing Astrophysics with the Square Kilometre Array (AASKA14)