Guillermo **Franco Abellán**

Postdoctoral Researcher, IFIC, CSIC-Universitat de València,
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Personal details

Birth date: December 3, 1995
Birthplace: Murcia, Spain
Citizenship: Spanish

Research interests

I'm a theoretical cosmologist, with a special interest in the phenomenology of particle physics models in cosmological observations. During my PhD, I derived state-of-the-art cosmological constraints on a large number of ΛCDM extensions, mostly motivated by the H_0/S_8 tensions, the neutrino mass problem, and inflation. As a postdoc, I focus on developing new deep learning tools in simulation-based inference (SBI) in order to accelerate and refine parameter inference for cosmology, as well as on improving the modeling of the cosmic neutrino background (CνB).

Academic positions

Nov. 2025 – current: **Postdoctoral Researcher** at Institut de Física Corpuscular (IFIC), CSIC-Universitat de València, Spain

Nov. 2022 – Sep. 2025: **Postdoctoral Researcher** at GRAPPA Institute, University of Amsterdam, The Netherlands

Education

Oct. 2019 – Oct. 2022: **Ph.D. in Physics, specialising in Cosmology,** Université de Montpellier, France
Supervisors: Vivian Poulin and Julien Lavalle
Thesis title: *Searching for new physics with CMB precision cosmology*, available online
Date of defense: July 18, 2022

Sep. 2018 – June 2019: **M.Sc. in Astroparticle Physis and Cosmology,** Université de Montpellier, France
Highest promotion grade (17.7/20)
Master internship: *Signatures of dark matter in the CMB*

Sep. 2013 – June 2018: **B.Sc. in Physics,** Universidad de Murcia, Spain and Universität Ulm, Germany (Exchange). Highest promotion grade (8.1/10)
Bachelor's thesis: *An introduction to supersymmetry*

Mentoring and supervision

2024 – 2025: **Supervision of Master student,** University of Amsterdam, The Netherlands
Master's Degree Candidate: Nicola Terzaghi

2023 – 2024: **Co-supervision of PhD student,** University of Amsterdam, The Netherlands
PhD candidate: Fabian Zimmer

2023 – 2025: **Co-supervision of PhD student,** University of Amsterdam, The Netherlands
PhD candidate: Oleg Savchenko

Teaching experience

2023 – 2024	Teaching assistant for *Student Seminar Theoretical Physics*, Master's Course (24h) University of Amsterdam, The Netherlands
2023	Teaching assistant for *Academic Skills for Research*, Master's Course (40h) University of Amsterdam, The Netherlands
2020	Tutored for *Fundamentals of Physics for Biologists*, Undergrad Course (64h) Université de Montpellier, France

General Skills

Languages	Spanish (*native*), English (*fluent*), French (*fluent*)
Coding	Python/PyTorch (*advanced*), C/C++(*advanced*), Mathematica(*basic*)
Scientific Software	CLASS (*developer*), Swyft (*developer*), MontePython, Cobaya, GetDist, SASHIMI, PyBird (*basic*), Pylians, Pinocchio (*basic*)
Misc.	LaTeX, Bash scripting, HTML (*basic*), git, Slurm

Scientific contributions

Since 2023	Referee for journals (A&A, JCAP, OJA, EPJ C)
Since 2023	Member of Euclid collaboration (Theory Science Working Group)
2022 – 2025	Handler of official Twitter/X and Bluesky accounts for GRAPPA
March 2023	Crash course on the CLASS code (2h), University of Amsterdam, The Netherlands

Organizational skills

May 2024	Member of Local Organizing Committee for *European AI for Fundamental Physics Conference* (*EuCAIFCon, 30 Apr.-3 May 2024*). Amsterdam, The Netherlands
2023 – 2024	Organizer of bi-weekly *Amsterdark* Seminar Series
Nov. 2023	Co-organizer of ISAPP PhD school *Exploring the dark universe* (*13-19 Nov. 2023*). Texel island, The Netherlands

Outreach

July 2022	*Anomalies en cosmologie: faire la lumière sur le secteur sombre de l'univers*, Journée des chercheurs non-permanents du LUPM, U. de Montpellier (France)
Apr. 2021	*Anomalías en cosmología: arrojando luz sobre el universo oscuro*, Invited talk for physics bachelor students, U. de Murcia (Spain)
Nov. 2019	*Dark Matter: the invisible structure of the Universe*, Public talk at Phd Pub, Montpellier (France)

References

Vivian Poulin
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Christoph Weniger
GRAPPA, University of Amsterdam
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Shin'ichiro Ando
GRAPPA, University of Amsterdam
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Julien Lesgourgues
RWTH Aachen
lesgourg@physik.rwth-aachen.de

Selected list of talks/seminars

As of January 10, 2026

Oct 2025	**Contributed Talk,** *Atelier Théorie, Univers et Gravitation, TUG 2025*, IPhT-Saclay (France)
July 2025	**Invited Talk,** *Ptolemy International Workshop*, Nijmegen (The Netherlands)
May 2025	**Seminar,** *Central European Institute for Cosmology and Fundamental Physics, CEICO*, Prague (Czech Republic)
Oct. 2024	**Contributed Talk,** *International Conference on Particle Physics and Cosmology, COSMO'24*, Kyoto (Japan)
June 2024	**Invited Talk,** *Exploring the Dark Side of the Universe, EDSU-Tools 2024,* Île de Noirmoutier (France)
May 2024	**Contributed Talk,** *European AI for Fundamental Physics, EuCAIFCon 2024*, Amsterdam (The Netherlands)
Jan. 2024	**Seminar,** *Centre de Physique Théorique, CPT,* Marseille (France)
Oct. 2023	**Contributed Talk,** *Atelier Théorie, Univers et Gravitation, TUG 2023,* Paris (France)
June 2023	**Seminar,** *Université Libre de Bruxelles, ULB,* Brussels (Belgium)
June 2023	**Contributed Talk,** *Third EuCAPT Annual Symposium*, Geneva @CERN (Switzerland)
May 2023	**Contributed Talk,** *Progress on Old and New Themes in cosmology, PONT 2023*, Avignon (France)
Mar. 2023	**Seminar,** *Instituto de Astrofísica de Canarias, IAC,* Tenerife (Spain) [remote]
Nov. 2022	**Seminar,** *Physics Reports Seminar Series* [remote]
Sep. 2022	**Seminar,** *University of the Western Cape, UWC,* Cape Town (South Africa) [remote]
July 2022	**Invited Talk,** *Intriguing inconsistencies in the growth of structure over cosmic time*, Sesto (Italy)
June 2022	**Seminar,** *Laboratoire de Physique des 2 Infinis Irène Joliot-Curie, IJCLab,* Orsay (France)
June 2022	**Contributed Talk,** *News from the dark* (*Episode 7: On Dark Matter Subhalos*), Montpellier (France)
Jan. 2022	**Contributed Talk,** 56^{th} *Rencontres de Moriond* (*Cosmology session*), La Thuile (Italy)
Dec. 2021	**Seminar,** *Max Planck Institute for Astrophysics*, Garching (Germany) [remote]
Nov. 2021	**Seminar,** *Stony Brook University, SBU,* Long Island (US)
Nov. 2021	**Seminar,** *University of Maryland, UMD,* Washignton D.C. (US)
Nov. 2021	**Seminar,** *John Hopkins University, JHU,* Baltimore (US)
Nov. 2021	**Seminar,** *Scuola Internaziole Superiore di Studi Avanzati, SISSA,* Trieste (Italy)
Oct. 2021	**Seminar,** *Institut de Ciènces del Cosmos, ICC,* Barcelona (Spain) [remote]
Oct. 2021	**Seminar,** *Instituto de Física Teórica, IFT,* Madrid (Spain)
Apr. 2021	**Contributed Talk,** *Rencontres de Physique des Particules, RPP 2021,* Tours (France) [remote]

Publication List

Guillermo F. Abellán
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As of January 10, 2026
[InspireHEP profile]

I am the author of 15 papers and 3 preprints (with <10 authors). These works accumulate more than 1300 citations and I have an h-index of 12. I have published in high-impact journals such as JCAP, JHEP, PRD and Physics Reports. One paper has now accrued over 500 citations (Ref. (A15)).

(A1) **G.F. Abellán**, *Neutrino decays as a natural explanation of the neutrino mass tension*, 2601.04312

(A2) N. Terzaghi*, **G.F. Abellán**, F. Zimmer and S. Ando, *Impact of neutrino decays on the Cosmic Neutrino Background anisotropies*, 2510.15818

(A3) **G.F. Abellán**, N. Anau Montel, O. Savchenko and C. Weniger, *How to embed any likelihood into SBI: Application to Planck + Stage IV galaxy surveys and Dynamical Dark Energy*, *Phys. Rev. D* **112** (2025) 103526 [2507.22990]

(A4) O. Savchenko*, **G.F. Abellán**, F. List, N. Anau Montel and C. Weniger, *Fast Sampling of Cosmological Initial Conditions with Gaussian Neural Posterior Estimation*, 2502.03139

(A5) F. Zimmer*, **G.F. Abellán** and S. Ando, *Effects of primordial fluctuations on relic neutrino simulations*, *JCAP* **10** (2024) 098 [2407.14582]

(A6) **G.F. Abellán**, G. C. Herrera, M. Martinelli, O. Savchenko, D. Sciotti and C. Weniger, *Fast likelihood-free inference in the LSS Stage IV era*, *JCAP* **11** (2024) 057 [2403.14750]

(A7) **G.F. Abellán**, M. Braglia, M. Ballardini, F. Finelli and V. Poulin, *Probing Early Modification of Gravity with Planck, ACT and SPT*, *JCAP* **12** (2023) 017 [2308.12345]

(A8) N. Schöneberg, **G.F. Abellán**, T. Simon, A. Bartlett, Y. Patel and T. L. Smith, *Comparative analysis of interacting stepped dark radiation*, *Phys. Rev. D* **108** (2023) 123513 [2306.12469]

(A9) **G.F. Abellán** and G. Facchinetti, *Minihalos as probes of the inflationary spectrum: accurate boost factor calculation and new CMB constraints*, *JCAP* **06** (2023) 032 [2304.02996]

(A10) N. Schöneberg and **G.F. Abellán**, *A step in the right direction? Analyzing the Wess Zumino Dark Radiation solution to the Hubble tension*, *JCAP* **12** (2022) 001 [2206.11276]

(A11) J. I. Juan, P. D. Serpico and **G.F. Abellán**, *The QCD phase transition behind a PBH origin of LIGO/Virgo events?*, *JCAP* **07** (2022) 009 [2204.07027]

(A12) T. Simon, **G.F. Abellán**, P. Du, V. Poulin and Y. Tsai, *Constraining decaying dark matter with BOSS data and the effective field theory of large-scale structures*, *Phys. Rev. D* **106** (2022) 023516 [2203.07440]

(A13) T. L. Smith, M. Lucca, V. Poulin, **G.F. Abellán**, L. Balkenhol, K. Benabed et al., *Hints of early dark energy in Planck, SPT, and ACT data: New physics or systematics?*, *Phys. Rev. D* **106** (2022) 043526 [2202.09379]

(A14) **G.F. Abellán**, Z. Chacko, A. Dev, P. Du, V. Poulin and Y. Tsai, *Improved cosmological constraints on the neutrino mass and lifetime*, *JHEP* **08** (2022) 076 [2112.13862]

(A15) N. Schöneberg, **G.F. Abellán**, A. Pérez Sánchez, S. J. Witte, V. Poulin and J. Lesgourgues, *The H_0 Olympics: A fair ranking of proposed models*, *Phys. Rept.* **984** (2022) 1 [2107.10291]

(A16) **G.F. Abellán**, R. Murgia and V. Poulin, *Linear cosmological constraints on 2-body decaying dark matter scenarios and the S_8 tension*, *Phys. Rev. D* **104** (2021) 123533 [2102.12498]

(A17) R. Murgia, **G.F. Abellán** and V. Poulin, *Early dark energy resolution to the Hubble tension in light of weak lensing surveys and lensing anomalies*, *Phys. Rev. D* **103** (2021) 063502 [2009.10733]

(A18) **G.F. Abellán**, R. Murgia, V. Poulin and J. Lavalle, *Implications of the S_8 tension for decaying dark matter with warm decay products*, *Phys. Rev. D* **105** (2022) 063525 [2008.09615]

* = Student supervised for the project

Collaboration papers ($>$ 10 authors)

- CosmoVerse Network collaboration, E. Di Valentino et al., *The CosmoVerse White Paper: Addressing observational tensions in cosmology with systematics and fundamental physics*, *Phys. Dark Univ.* **49** (2025) 101965 [2504.01669]
- Euclid collaboration, L. W. K. Goh et al., *Euclid preparation. Cosmology Likelihood for Observables in Euclid (CLOE). 5. Extensions beyond the standard modelling of theoretical probes and systematic effects*, 2510.09147
- E. Abdalla et al., *Cosmology intertwined: A review of the particle physics, astrophysics, and cosmology associated with the cosmological tensions and anomalies*, *JHEAp* **34** (2022) 49 [2203.06142]

Proceedings

- O. Savchenko, F. List, **G.F. Abellán**, N. Anau Montel and C. Weniger, *Mean-Field Simulation-Based Inference for Cosmological Initial Conditions*, in *38th conference on Neural Information Processing Systems*, 10, 2024, 2410.15808
- **G.F. Abellán**, *The H_0 Olympics: a fair ranking of proposed models*, Proceedings of the 56^{th} Rencontres de Moriond (2022 Cosmology) p. 63