

Curriculum Vitae

Personal details

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Date of CV: July 23, 2024

Research interests

Cosmology: cosmic microwave background, large-scale structure, Hubble and S_8 tensions, non-cold dark matter, neutrino cosmology, Bayesian statistics, machine learning

Academic positions

Since 2022 **Postdoctoral Research Fellow** at GRAPPA Institute, University of Amsterdam, The Netherlands

Education

2019 - 2022 **Ph.D. in Physics, specialising in Cosmology**, Université de Montpellier, France
Supervisors: Vivian Poulin and Julien Laval
Thesis title: *Searching for new physics with CMB precision cosmology*

2018 - 2019 **M.Sc. in Astroparticle Physics and Cosmology**, Université de Montpellier, France
Graduated with honours
Master internship: *Signatures of dark matter in the CMB*

2013 - 2017 **B.sc. in Physics**, Universidad de Murcia, Spain and Universität Ulm, Germany (Exchange). Graduated with honours
Bachelor's thesis: *An introduction to supersymmetry*

Mentoring and supervision

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

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

Since 2022 **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

Technical skills

Coding	PYTHON, PYTORCH, C/C++, MATHEMATICA, L ^A T _E X, Bash, git, Slurm
Software	Extensive knowledge of CLASS (Boltzmann solver), MONTE PYTHON (likelihood-based inference) and SWYFT (deep learning, simulation-based inference)

Languages

Spanish	Native
English	Fluent
French	Fluent

General contributions

Since 2023	Referee for journals (Astronomy & Astrophysics, JCAP)
Since 2023	Member of Euclid collaboration (Theory Work Package: Likelihood and forecasts)
Since 2022	Handler of official Twitter/X account 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 <i>European AI for Fundamental Physics Conference (EuCAIFCon, 30 Apr.-3 May 2024)</i> . Amsterdam, The Netherlands.
2023 - 2024	Organizer of bi-weekly <i>Amsterdark</i> Seminar Series
Nov. 2023	Co-organizer of ISAPP PhD school <i>Exploring the dark universe (13-19 Nov. 2023)</i> . Texel island, The Netherlands.

Outreach

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

References

Vivian Poulin
LUPM, University of Montpellier
vivian.poulin@umontpellier.fr

Tristan L. Smith
Swarthmore College
tsmith2@swarthmore.edu

Christoph Weniger
GRAPPA, University of Amsterdam
c.weniger@uva.nl

Julien Lesgourgues
RWTH Aachen
lesgourg@physik.rwth-aachen.de

Invited seminars and talks

- Jan. 2024 **CPT Cosmology Seminar**, Marseille (France)
- Oct. 2023 **LUPM Cosmology Seminar**, Montpellier (France)
- June 2023 **Université Libre de Bruxelles PhysTh Seminar**, Brussels (Belgium)
- Mar. 2023 **Instituto de Astrofísica de Canarias Seminar**, Tenerife (Spain) [remote]
- Nov. 2022 **Physics Reports Seminar Series** [remote]
- Sep. 2022 **UWC Cosmology Seminar**, Cape Town (South Africa) [remote]
- June 2022 **IJCLab Cosmology Seminar**, Orsay (France)
- Dec. 2021 **MPA Cosmology Seminar**, Garching (Germany) [remote]
- Nov. 2021 **Stony Brook University Seminar**, Long Island (USA)
- Nov. 2021 **NYU/CCA Cosmology meeting**, New York (USA) [remote]
- Nov. 2021 **University of Maryland Seminar**, Washington D.C. (USA)
- Nov. 2021 **John Hopkins University Seminar Series**, Baltimore (USA)
- Nov. 2021 **Scuola Internazionale Superiore di Studi Avanzati Seminar**, Trieste (Italy)
- Oct. 2021 **Institut de Ciències del Cosmos Seminar Series**, Barcelona (Spain) [remote]
- Oct. 2021 **Instituto de Física Corpuscular Seminar Series**, Valencia (Spain)
- Oct. 2021 **Instituto de Física Teórica Seminar Series**, Madrid (Spain)
- May 2021 **Institute d'Astrophysique de Paris ICAP meeting**, Paris (France) [remote]

Conferences and workshops

- June 2024 *Exploring the Dark Side of the Universe, EDSU-Tools 2024*, Île de Noirmoutier (France)
- Nov. 2023 *Debating the potential of machine learning in astronomical surveys, ML-IAP/CCA 2023*, Paris (France)
- Oct. 2023 *Atelier Théorie, Univers et Gravitation, TUG 2023*, Paris (France)
- June 2023 *Third EuCAPT Annual Symposium*, Geneva @CERN (Switzerland)
- May 2023 *Progress on Old and New Themes in cosmology, PONT 2023*, Avignon (France)
- July 2022 *Intriguing inconsistencies in the growth of structure over cosmic time*, Sesto (Italy)
- June 2022 *News from the dark (Episode 7: On Dark Matter Subhalos)*, Montpellier (France)
- Jan. 2022 *56th Rencontres de Moriond (Cosmology session)*, La Thuile (Italy)
- Dec. 2021 *Atelier Théorie, Univers et Gravitation, TUG 2021*, Paris (France)
- May. 2021 *XIV International Workshop on Interconnections between Particle Physics and Cosmology, PPC 2021*, Oklahoma (USA) [remote]
- Apr. 2021 *Rencontres de Physique des Particules, RPP 2021*, Tours (France) [remote]
- Dec. 2020 *Progress on Old and New Themes in cosmology, PONT 2020*, Avignon (France) [remote]

Publications

Leading contribution is indicated in **bold**.

Students supervised for the project are indicated in *italics*.

- (A1) Zimmer, Fabian, G. F. Abellán and S. Ando, *Effects of primordial fluctuations on relic neutrino simulations*, [2407.14582](#)
- (A2) **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*, Submitted to JCAP [[2403.14750](#)]
- (A3) **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](#)]
- (A4) 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](#)]
- (A5) **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](#)]
- (A6) 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](#)]
- (A7) 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](#)]
- (A8) 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](#)]
- (A9) 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](#)]
- (A10) 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](#)]
- (A11) **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](#)]
- (A12) 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](#)]
- (A13) **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](#)]
- (A14) 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](#)]
- (A15) **G.F. Abellán**, R. Murgia, V. Poulin and J. Lavalley, *Implications of the S_8 tension for decaying dark matter with warm decay products*, *Phys. Rev. D* **105** (2022) 063525 [[2008.09615](#)]

Proceedings

- **G.F. Abellán**, *The H_0 Olympics: a fair ranking of proposed models*, Proceedings of the 56th Rencontres de Moriond (2022 Cosmology) p. 63

Theses

- **G.F. Abellán**, *Searching for new physics with CMB precision cosmology*, Ph.D. thesis, LUPM, Université de Montpellier (2022), [available online](#)