



Gaétan Facchinetti

Date of birth: February 20, 1994 — French

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ACADEMIC POSITIONS

2021 - 2024 Service de physique théorique
Université Libre de Bruxelles, Belgium
Postdoctoral researcher: Cosmology imprints of/on particle physics models

EDUCATION

2018 - 2021 Laboratoire Univers et Particules de Montpellier
Université de Montpellier, France
Ph.D in theoretical physics (dark matter, cosmology, particle physics, astrophysics)
Analytical study of particle dark matter structuring on small scales and implications for dark matter searches
Supervised by Julien Lvalle, defended July 2021 in front of Shin'ichiro Ando, Pasquale Serpico, Céline Boehm, Marco Cirelli, Jorge Pañarrubia, Pierre Salati and Tracy Slatyer

2017 - 2018 Ecole Normale Supérieure & Ecole Normale Supérieure de Cachan
Université Pierre et Marie Curie — Paris VI, France
Master's degree in theoretical physics at International Center for Fundamental Physics (15.3/20)
Quantum field theory, gauge theory of electroweak interactions, quantum chromodynamics, renormalisation, invariances and group theory, general relativity, cosmology, statistical field theory, statistical physics: advanced and new applications

2015 - 2017 Université Paris-Saclay & Ecole Normale supérieure de Cachan,
Université Versailles Saint-Quentin-en-Yvelines, France
Master's degree in mathematics: Analysis, Model and Simulation (17.3/20)
Analysis of partial differential equations, finite element and volume method, electromagnetism from a mathematician point of view, parallel computing, introduction to particle physics, advanced hydrodynamics, path integrals, statistical quantum physics

2014 - 2015 Ecole Normale Supérieure de Cachan,
Université Pierre et Marie Curie — Paris VI, France
Bachelor's degree in physics: Theory, Experiment, Model (16.9/20)

2012 - 2014 Lycée Privé Sainte Geneviève, Versailles, France
Classe préparatoire: a two year intensive formation in mathematics and physics

COMPLEMENTARY SKILLS

Languages French (native speaker), English (good working level — TOEIC 965/990), Spanish (occasional practice)
Programming C/C++, Python, Mathematica, Fortran 90, OpenMPI, OpenMP, git, LaTeX, Bash

INTERNSHIPS (RESEARCH)

- Apr. - Jun. 2018 Internship at Laboratoire Univers et Particules de Montpellier
Université de Montpellier, France
Investigated the chemical and kinetic decoupling of dark matter and the formation of the first structures in the Universe
- Mar. - Jul. 2017 Internship at Laboratoire de Physique théorique de la Matière Condensée
Université Pierre et Marie Curie — Paris VI, France
Numerically studied the « BMW » equations of the non perturbative renormalisation group
- Apr. - Aug. 2016 Internship in the department of mathematical sciences,
Université of Southampton, England
Studied the collective behavior of atomic dipoles in a 2D lattice
- May - Jun. 2015 Internship at Laboratoire de Physique Nucléaire et des Hautes Energies
Université Pierre et Marie Curie — Paris VI, France
Simulated a small model of Time projection Chamber for the DarkSide Experiment

LECTURING AND TUTORING

- 2022 Université Libre de Bruxelles, Belgium
Tutor: electromagnetism and special relativity for 2nd year undergraduate students
- 2020 - 2021 Université de Montpellier, France
Lecturer: Optics/Human vision for 2nd year undergraduate students
- 2018 - 2019 Université de Montpellier, France
Tutor: general physics for 1st year undergraduate students
- Oct. - Dec. 2015 Ecole Normale Supérieure de Cachan, France
Internship as physics teacher for high-school students

ADMINISTRATIVE RESPONSABILITIES

- 2019 - 2020 Laboratoire Univers et Particules de Montpellier, France
Elected member of the laboratory administrative board, in charge of the non permanent staff

PARTICIPATION TO INTERNATIONAL SCHOOLS

- 2019 Galileo Galilei institute for Theoretical Physics, Firenze, Italy
GGI lectures on the theory of fundamental interactions
Max-Planck-Institute für Kernphysik, Heidelberg, Germany
ISAPP summer school, The Dark Side of the Universe

OUTREACH PRESENTATIONS

- Feb. 2020 High-school students welcoming days, Université de Montpellier, France
Title: A thesis in theoretical physics
- Jan. 2020 Ph.D pub meetings in Montpellier, France
Title: Dark Matter, the invisible structure of the Universe (in collaboration with G. F. Abellán)
- Jul. 2019 Doctoral school (Information, Structures Systems) days, Université de Montpellier, France
Title: The invisible structuring of galaxies, Winner of the oral presentation prize

REFEREED OR SUBMITTED ARTICLES

- 2020 **G. Facchinetti, J. Lavalle and M. Stref:** Statistics for dark matter subhalos searches in gamma-rays from a kinematically constrained population model I: Fermi-LAT-like telescopes. arXiv:2007.10392
- 2018 **G. Facchinetti and J. Ruostekoski:** Phys. Rev. A (97):023833 Feb. 2018
- 2016 **G. Facchinetti, S.D. Jenkins and J. Ruotekoski:** Phys. Rev. Lett. 117(24):243601, Dec. 2016

MANUSCRIPTS IN PREPARATION

- Exp. 2022 **G. Facchinetti, J. Lavalle and M. Stref:** Statistics for dark matter subhalos searches in gamma-rays from a kinematically constrained population model II: CTA-like telescopes
- G. Facchinetti, M. Stref and J. Lavalle:** Effect of stars on the Galactic dark matter subhalo population
- G. Facchinetti and J. Lavalle:** Statistics of subhalos in a simplified dark matter model
- T. Lacroix, G. Facchinetti, J. Pérez-Romero, M. Stref, J. Lavalle, D. Maurin, M. Sánchez-Conde:** Classification of targets for gamma-ray dark matter searches with velocity-dependent annihilation
- T. Lacroix, G. Facchinetti, J. Pérez-Romero, M. Stref, J. Lavalle, D. Maurin, M. Sánchez-Conde:** Subhalo boost factor in a Sommerfeld enhanced scenario
- G. F. Abellán, G. Facchinetti, V. Poulin:** Constraining the matter power spectrum on small scales with the CMB and ultra compact mini halos

SEMINARS AND CONFERENCE PRESENTATIONS

- 2021 **Talk, workshop News From The Dark, Annecy-le-Vieux, France**
An analytical model of subhalo population: mass function and stellar encounters
- Seminar at Service de Physique Théorique, Université Libre de Bruxelles, Belgium**
Analytical study of particle dark matter structuring on small scales and implications for dark matter searches
- Talk, conference Cosmo'21, University of Illinois, USA (online)**
Subhalo properties in a simplified dark matter model and the impact on indirect searches
- 2020 **Seminar at Laboratoire d'Annecy-le-Vieux de Physique Théorique, France**
Dark matter subhalo population in the Milky Way: from particle models to gamma-rays point sources
- Seminar for the ICAP meetings, Institut d'Astrophysique de Paris, France**
Statistics of the subhalo population in the Milky Way for the detection of dark matter point sources
- Talk, workshop News From the Dark, Université de Montpellier, France**
Cold dark matter subhalos in the Milky Way: baryonic tides and impact on indirect searches
- 2019 **Talk, conference TeVpa, University of Sydney, Australia**
Statistics of subhalos in the Milky Way for dark matter indirect searches with gamma-rays
- Talk, conference IRN Terascale, Université Libre de Bruxelles, Belgium**
Statistics of the subhalo population in the Milky Way for the detection of dark matter point sources
- Poster presentation, conference DSU, Universidad de Buenos Aires, Argentina**
Subhalo properties in a simplified dark matter model
- Poster presentation, workshop Invisibles, Universidad de Valencia, Spain**
Subhalo properties in a simplified dark matter model
- Talk, workshop News From the Dark, Université de Montpellier, France**
Subhalos: the connection with simplified particle dark matter models