

Antoine C. Petit

Current position

CNRS researcher at the Lagrange laboratory, Côte d'Azur Observatory

Contact

Obs. de la Côte d'Azur
Blvd de l'Observatoire
CS 34229
F 06304 Nice Cedex 4
France

+33 6 76 74 99 61

antoine.petit[at]oca.eu

acpetit.github.io
github.com/acpetit

– ORCID –

0000-0003-1970-1790

– Nationality –

French

Languages

French – native
English – fluent
Spanish – medium
Swedish – beginner

Programming

– HPC –

C++ & OpenMP
Fortran

– Data analysis –

Python
Jupyter, numpy
Julia, Matlab

– General skills –

Linux, git, bash, \LaTeX

Research interests

My research focuses on planet dynamics, particularly in the context of planet formation and close to instability systems. I use analytical and numerical methods to understand how planet interactions shape exoplanetary system architecture. I also have applied my theoretical skills in the context of specific planetary systems in order to understand their history.

Research experience

- 2023 – **CNRS permanent researcher** [Observatoire de la Côte d'Azur, Nice, France](#)
Laboratoire Lagrange, Équipe Théorie et Observation en Planétologie
- 2021–2023 **Postdoctoral researcher** [University of Copenhagen, Copenhagen, Denmark](#)
StarPlan section, Globe Institute. Collaborators: A. Johansen, M. Lambrechts.
- 2019–2021 **Postdoctoral researcher** [Lund Observatory, Lund, Sweden](#)
Collaborators: A. Johansen, Postdoctoral fellowship in observational and theoretical astronomy.
- 2016–2019 **Post-graduate research** [Paris Observatory, Paris, France](#)
"Architecture and stability of planetary systems",
Supervisors: Jacques Laskar and Gwenaél Boué.
- 2016 **Master thesis in astrophysics** [Paris Observatory, Paris, France](#)
"First order mean motion overlap in planetary systems",
Supervisor: Jacques Laskar.
- 2015 **Master thesis in mathematics** [ENS, Paris, France](#)
"Herman resonance in the three-body problem in four dimensions",
Supervisor: Jacques Féjoz.
- 2014 **Research internship (6 months)** [UCSC, California, USA](#)
"Mixing and transport of metals by turbulence in galactic discs",
Supervisors: Mark Krumholz and Doug Lin.

Scientific publications

12 peer-reviewed publications (7 as first author). 275 citations and h-index 7. Publication list: [NASA ADS](#).

Education

- 2016 – 2019 **PhD in Astrophysics** [Paris Observatory, France](#)
Title: "Architecture and stability of planetary systems",
Supervisors: Jacques Laskar and Gwenaél Boué.
Defended the 28th of June 2019.
- 2016 **Diploma of the École Normale Supérieure (ENS)** [ENS, Paris, France](#)
Most selective research focused university in France.
Specialization in Physics and Mathematics.
- 2016 **Master degree in Theoretical Physics** [ENS, Paris Observatoy & UPMC, Paris, France](#)
Specialization in celestial mechanics, statistical physics & general relativity.
- 2015 **Master degree in Mathematics** [ENS, & UPMC, Paris, France](#)
Specialization in dynamical systems and differential geometry.
- 2013 **Bachelor degree, Physics** [ENS, Paris, France](#)
- 2012 Accepted 9th at the ENS after competitive exam. Physics department.
- 2010 – 2012 **Preparatory school in MPSI/MP*** [Lycée du Parc, Lyon, France](#)
- 2010 **French Science Baccalauréat (High school diploma)** [Grenoble, France](#)

Awards and funding

2020	Marie Skłodowska-Curie action Seal of Excellence (87/100). Projet: Linking Exoplanet system Architecture to Planet Formation theories
2019	Fysiografen grant : The Fund of the Walter Gyllenberg Foundation : 220,000 kr (21,000 €)
2016	PhD grant from the French government accorded by the ENS.
2012	4-year fellowship as a trainee civil servant at the ENS.

Presentations and Conferences

International conference presentations

The invited presentations are marked with a star *.

2022	CELMEC VIII An integrable model for first-order three-planet mean motion resonances	Rome, Italie
2021	PLATO Mission conference Plato and the spacing of compacts systems	Online
2021	IAU 364 Symposium, Multi-scale dynamics of space objects The path to instability of compacts systems	Online
2020	PLATO ESP workshop Spacing and stability of compacts systems	Online
2018	PLATO Theory Workshop Hill stability in the AMD framework	Cambridge, UK
2018	PNP prospective colloquium Hill stability in the AMD framework	Nice, France
2017	* Exoplanets and Planet Formation AMD-stability and the classification of exoplanets	Shanghai, Chine
2017	CELMEC VII AMD-stability in the context of first-order MMRs	Viterbo, Italy

Seminars

2022	Séminaire ASD An integrable model for first-order three-planet mean motion resonances	Observatoire de Paris, France
Nov. 2021	Planetology team seminar Dynamical constraints on planetary systems formation	OCA, Nice, France
Dec. 2020	Exoplanets team seminar Resonance and dynamical constraints on the K2-19 system	IPAG, Grenoble, France
Nov. 2020	IPAG/IRAM Seminar Dynamical constraints on planetary systems architecture	Grenoble, France
Oct. 2019	Astronomy department seminar Architecture and stability of planetary systems	Lund, Suède
Jan. 2019	Planet formation meeting Dynamical constraints on planet formation	Lund, Suède
2018	ASD Team seminar Hill-stability in the AMD framework	Paris, France
2017	IMCCE Postdocs and PhD students seminar AMD-stability in the context of first-order MMRs	Paris, France

Teaching and Supervision

2020 – 2021	Master project supervisor Supervision of Kaltrina Kajtazi for a 1.5 year master project. Subject: Capture of planets into mean motion resonances.	Lund University, Sweden
2020	Teaching Assistant Stellar Structure and Evolution (Master)	Lund University, Sweden
2019	Culture night outreach talk The moons of the Solar System	Lund University, Sweden
2018–2019	Teaching Assistant Exercises sessions of probabilities and Lebesgue integration at Bachelor level (40 hours). Graded all written work, and final written exams.	Dauphine University, Paris, France
2013	Oral examiner Mathematics examiner in preparatory classes.	Lycée Louis le Grand, Paris, France

Participation in community duties

2019 –	Member of the IAU and SF2A.
2022	Organization of the department seminar StarXiv
2021	Postdoc representative at Lund Observatory

Role as a reviewer and examiner

2017 –	Reviewed 17 articles for the leading international astronomy journals: Astronomy & Astrophysics, Monthly Notices of the Royal Astronomical Society, The Astronomical Journal, Nature Astronomy, Icarus, Celestial Mechanics and Dynamical Astronomy and, SIAM Journal on Applied Dynamical Systems.
2020	Examiner and committee for Astronomy and Astrophysics Bachelor and Master thesis defences

Conferences organization committees

2022	EuroPlanet Science Congress 2022 Co-organizer of the session "Formation, evolution, and stability of extrasolar systems (EXOAT)"	Grenade, Espagne
2020	Compact Object For All Meeting LOC member	Lund, Suède

Outreach conferences

2023	Public conference Chaos in planet dynamics and the Solar System	La Turbie, France
2022	Astronomy on Tap Virtual Space: How to model planet orbits?	Copenhagen, Danemark
2019	Culture night outreach talk The moons of the Solar System	Lund University, Sweden
2017 – 2019	Introduction to astronomy for secondary school students Bi-annual intervention with a small group students asking questions about my work and astronomy in general.	Paris Observatory, France

Publications

12 publications (7 as first author). 275 citations, h-index of 7. See the complete list on [NASA/ADS](#).

2022	Mean motion resonance capture in the context of type-I migration K. Kajtazi*, A. C. Petit , A. Johansen	A&A, 669, A44
2022	A CHEOPS-enhanced view of the HD3167 system V. Bourrier, A. Deline, A. Krenn, J. A. Egger, A. C. Petit , et al.	A&A, 668, A31
2022	A low accretion efficiency of planetesimals formed at planetary gap edges L. Eriksson, T. Ronnet, A. Johansen, R. Helled, C. Valletta & A. C. Petit	A&A, 661, A73
2021	An integrable model for first-order three-planet mean motion resonances A. C. Petit	CMDA, 133(8), 39
2020	The path to instability in compact multi-planetary systems A. C. Petit , G. Pichierri, M. B. Davies, A. Johansen	A&A, 641, A176
2020	Resonance in the K2-19 system is at odds with its high reported eccentricities A. C. Petit , E. A. Petigura, M. B. Davies, A. Johansen	MNRAS, 496, 3
2019	High-order regularised symplectic integrator for collisional planetary systems A. C. Petit , J. Laskar, G. Boué & M. Gastineau	A&A, 628, A32
2019	Nearly Polar orbit of the sub-Neptune HD3167 c: Constraints on a multi-planet system dynamical history S. Dalal, G. Hébrard, A. Lecavelier, A. C. Petit , et al.	A&A, 631, A28
2018	Hill stability in the AMD framework A. C. Petit , J. Laskar & G. Boué	A&A, 617, A93
2017	AMD-stability in the presence of first-order mean motion resonances A. C. Petit , J. Laskar & G. Boué	A&A, 607, A35
2017	AMD-stability and the classification of planetary systems J. Laskar & A. C. Petit	A&A, 605, A72
2015	Mixing of metals by gravitational instability-driven turbulence in galactic discs A. C. Petit , M. Krumholz, N. Goldbaum & J. Forbes	MNRAS, 449, 3

* Supervised student