

CURRICULUM VITAE

Philippe BARATTA

- › Computational Biologist
- › Astrophysicist
- › Data Scientist

Resume

BIRTH

April 2, 1993 in Marseille, France

ADDRESS

59, avenue de la grande gorge
13009, Marseille

PHONE NUMBER

06 65 03 66 52

MAIL ADDRESS

philippe.baratta@univ-amu.fr

LANGUAGES

French, English

PERSONAL SITUATION

Two children

SOCIAL MEDIA

LINKEDIN.COM/IN/PHILIPPE-BARATTA

Trained in theoretical physics and mathematics, I advanced to a PhD and a subsequent two-year postdoctoral tenure in observational cosmology, contributing to the Euclid Consortium project under ESA. My academic journey includes a teaching role at Aix-Marseille University. Currently, I am immersed in the field of computational biology, focusing on single-cell RNA sequencing data analysis. My present interest lies in developing innovative tools for spatially resolved transcriptomic data.

Career evolution

PRESENT POSITION

- Research Engineer in Computational Biology, specialized in Genetics.
Hosted at MMG and I2M, supervised by Anaïs Baudot (CNRS, AMU, MMG)
Starting from November 2023

PREVIOUS POSITION

- Temporary Teaching and Research Associate at AMU
Data Scientist and Project Manager for the Euclid Consortium Project (ESA)
Hosted at CPPM from September 2020 to September 2022

DEGREES

- PhD in Astrophysics & Cosmology at CPPM and CPT on the subject:
« [A new Monte Carlo approach for galaxy clustering analysis](#) »
Supervised by Anne Ealet (director at IP2I, CNRS, Lyon) and Julien Bel (AMU, CPT)
Founded by the Euclid project (ESA) and CNES with the « *Euclid premium grant* »
Defended on January 15, 2021
- Master's degree P3TMA (Theoretical Physics and Mathematics, Particle Physics and Astroparticles) in « *Relativistic Theoretical orientation* » at AMU in 2017 (rank = 2)
- Bachelor's degree of Physics at AMU in 2015

INTERNSHIPS

On theoretical cosmology at CPT :

- *Study of the constraints of primordial nucleosynthesis to modified gravity models*
supervised by Christian Marinoni and Julien Bel (Mar-Jun 2017)
- *Geometrical destabilization of inflationary trajectories in nonlinear sigma model*
supervised by Jose Beltrán Jimenez (Oct-Dec 2016)
- *Cosmic parallax; detecting our acceleration through space*
a computing project supervised by Julien Bel and Christian Marinoni
- *Study of the generation of cosmological perturbations from primordial inflation*
supervised by Federico Piazza and Jose Beltrán Jimenez (May-Jun 2016)

AFFILIATIONS

AMU

Aix-Marseille Université, France

ESA

European Spatial Agency
Paris, France

CNES

Centre National d'Etudes Spatiales
Toulouse, France

CPPM

Centre de Physique des Particules de
Marseille, France

CPT

Centre de Physique Théorique
Marseille, France

MMG

Marseille Medical Genetics
Marseille, France

I2M

Institut de Mathématique de Marseille
Marseille, France

Research & Engineering

FIELDS OF INTEREST

- Single cell RNA sequencing data analysis
- Spatial transcriptomic data analysis tools development
- Galaxy Clustering

SKILLS

GENERAL SKILLS

- Data Analysis : Signal Processing in Fourier + configuration + harmonic spaces, Statistical estimator development, N-point statistics, Bayesian inference, Monte Carlo Markov Chain, Clustering algorithm, Minkowski Functionals and Tensors
- Simulation : static 2D/3D field (discrete or continuous) Monte Carlo realization, dynamic N-Body simulation
- Modelling : Gaussian & non-Gaussian field, non-linear observables, non-Gaussian Likelihood

PROGRAMMING LANGUAGES

Python, R, Wolfram Mathematica, Latex

MASTERED INFORMATICS TOOLS

GitHub, Docker, [MPI](#) / [NUMBA](#) parallel programming, HPC

MASTERED BIO-INFORMATICS TOOLS

- as developer : [scDataPipeline](#)
- as user : [SEURAT](#), [DoubletFinder](#), [scanpy](#), [squidpy](#)

MASTERED COSMOLOGICAL TOOLS

- as developer : [COVMOS](#) , [PySSC](#)
- as user: [AngPow](#) , [CLASS](#) , [Healpix](#) , [NBody-Kit](#) , [MontePython](#) , [PyCorr](#)

TALKS & POSTER

- POSTER: ‘Technical and Physical Workshop’ at CPPM, Marseille, France (25/10/17)
- TALK: ‘[Euclid France 7e Symposium](#)’ in Nice, France (26/11/18 - 28/11/18)
- TALK: ‘[Hot topics in Modern Cosmology](#)’ at IESC Cargèse, France (5/5/19 - 11/5/19)
- TALK: ‘[Outils de l’action dark energy S1](#)’ at CCIN2P3, Lyon, France (28/5/19)
- TALK: ‘[Euclid France Galaxy Clustering](#)’ at LAM, Marseille, France (13/11/19)
- TALK: ‘[Outils de l’action dark energy S2](#)’ at IHP, Paris, France (19/11/19)
- SEMINAR: ‘PhD seminars’ at CPPM, Marseille, France (17/12/19)
- TALK: ‘[Euclid Meeting 2020](#)’ in Barcelona, Spain (4/5/20 - 8/5/20)
- TALK: ‘[Euclid France Galaxy Clustering](#)’ in ZOOM-telecon (20/4/21)
- TALK: ‘[Euclid Consortium 2022](#)’ in Oslo, Norway (29/4/22)
- SEMINAR: ‘[COVMOS: a fast mock simulator for multiple applications](#)’ at MPE, Garching, Germany (9/3/22)

- SEMINAR ‘[Statistical methods in observational Cosmology](#)’ at Luxembourg University (15/1/23)
- COLLAB STATUS : ~1 per month in diverse Euclid Working Groups
- POSTER : ‘[ScDataPipeline : a Reproducible Framework for RNA-Sequencing Analysis](#)’ in [Marseille](#) and [Toulouse](#) (18-19/4/24 & 25-28/6/24)
- TALK: ‘Stellar Statistics Meet Cellular Mystics: Minkowski and Landy-Szalay Take on Transcriptomics’ at MMG, Marseille (9/9/24)

AWARD

[Euclid Star Prize 2020](#) in the category *PhD student* ‘for essential contributions towards the estimate of the covariance between cosmological observables’

SCHOOLS

- [\$\Lambda\$ CDM and Beyond: Cosmology Tools in Theory and in Practice](#)’ in Corfu, Greece (4/9/17 - 15/9/17)
- ‘[École d’été Euclid](#)’ in Roscoff, France (20/8/18 - 1/9/18)
- ‘[École d’été Euclid](#)’ in Banyuls, France (19/8/19 - 31/8/19)

DIVERS

Team’s server manager
Organiser of the Journal Club (MMG + I2M)

INSTRUMENTATION EXPERIENCE

Executed a series of four intensive 24-hour shifts for the characterization of the NISP instrument on the Euclid satellite from March to May 2018

Teaching

LECTURE CLASS

- Physics option for scientific upgrading (20h): introduction to astrophysics, nuclear physics, thermodynamics, Newtonian physics

TUTORIAL CLASSES

- Mathematics (30h); linear algebra, series, differential calculus
- Physics option for scientific upgrading (20h): introduction to astrophysics, nuclear physics, thermodynamics, Newtonian physics
- Basics of electricity (18h) : permanent and transient systems
- Geometrical optics (18h) : Interfaces, microscopes, telescopes

PRACTICAL WORKS

- Mathematics (48h) : Python programming ([responsible for this teaching unit](#))
- Basics of electricity and Geometrical optics (108h)
- Electromagnetism (9h) : electrostatics, magnetostatics
- Newtonian physics (8h) : hydrostatics, falling body

DIVERSE

- Electromagnetism: 24h of private lessons « [Mission Handicap AMU](#) » in August 2015
- Stand animation at ‘[Village des Sciences](#)’:
 - (13/10/17 - 15/10/17), Archives départementales de Marseille, France
 - (12/10/19 - 13/10/19), Place Bargemont, Marseille, France
 - (8/10/21 - 9/10/21), Place Bargemont, Marseille, France
- Science outreach event : ‘[Recherches dans la ville](#)’ in Palais Longchamps (December 2024), Marseille

Articles and Public Codes

‘*High-precision Monte Carlo modelling of galaxy distribution*’ **Baratta**, Bel, Ealet, Plaszczynski ([Astronomy and Astrophysics Journal](#))

‘*COVMOS: a new Monte Carlo approach for galaxy clustering analysis*’ **Baratta**, Bel, Gouyou Beauchamps, Carbone ([Astronomy and Astrophysics Journal](#))

‘*Cosmological inference including massive neutrinos from the matter power spectrum: biases induced by uncertainties in the covariance matrix*’ Gouyou Beauchamps, **Baratta**, Escoffier, Gillard, Bel, Bautista, Carbone ([arXiv preprint](#))

‘*Impact of survey geometry and super-sample covariance on future photometric galaxy surveys*’ Gouyou Beauchamps, Lacasa, Tutusaus, Aubert, **Baratta**, Gorce, Sakr ([Astronomy and Astrophysics Journal](#))

‘*Efficient Computation of Super-Sample Covariance for Stage IV Galaxy Surveys*’ Lacasa, Aubert, **Baratta**, Carron, Gorce, Sakr ([Astronomy and Astrophysics Journal](#))

‘*Euclid preparation. TBD. Forecast impact of super-sample covariance on 3x2pt analysis with Euclid*’ Euclid members ([arXiv preprint](#))

- [COVMOS](#) : *COVMOS is an open-source Python library designed for rapidly simulating catalogues of cosmic objects in both real and redshift space.* Author :**Baratta**
- [PySSC](#) : *A Python implementation of the fast super-sample covariance* Authors: Lacasa, **Baratta**, Gorce
- [scDataPipeline](#) : *Reusable standard single-cell RNA sequencing data analysis pipeline* Authors : Chevalier, Loire, Rafatov, **Baratta**

REFERENCES

Dr. Anais Baudot (supervisor, DR at MMG, Marseille, France):

anais.baudot@univ-amu.fr

Dr. Julien Bel (PhD advisor, researcher at CPT, Marseille, France, Euclid member) :

julien.Bel@cpt.univ-mrs.fr

Dr. Carmelita Carbone (collaborator, researcher at INAF, Milano, Italy, Euclid member) :

carmelita.carbone@inaf.it

Pr. Stéphane Plaszczyński (collaborator, researcher at IJClab, Paris, France) :

stephane.plaszczyński@ijclab.in2p3.fr

Dr. Anne Ealet (PhD advisor, head of the IP2I lab, Lyon, France, Euclid member) :

a.ealet@ip2i.in2p3.fr

Dr. Stéphanie Escoffier (collaborator, researcher at CPPM, Marseille, France, Euclid member) :

escoffier@cppm.in2p3.fr