Curriculum Vitae

Giovanni Aricò

Research positions

2025–2027 **Senior Research Fellow**

Institution: Istituto Nazionale di Fisica Nucleare (INFN), Bologna, Italy
Research topics: Large Scale Structure of the Universe, cosmological parameters, modified gravity, baryonic physics, N-body simulations;
Advisor: Prof. Dr. Marco Baldi;

2022–2024 **Postdoctoral Researcher**

Institution: Institute for Computational Science/Institut für Astrophysik, University of Zürich, Switzerland
Research topics: Large Scale Structure, simulations, baryons, machine learning;
Advisors: Prof. Dr. Aurel Schneider, Prof. Dr. Joachim Stadel;

Education

2017–2021 **PhD** in Physics

Institutions: Universidad de Zaragoza, Spain;
Donostia International Physics Center, Donostia;
Centro de Física del Cosmo de Aragón, Teruel;
Research Plan: Maximising the information from next-generation surveys;
Thesis: Cosmology with baryons: modelling the cosmic matter distribution for Large-Scale Structure analyses (link);
Supervisors: Prof. Dr. Raul E. Angulo, Dr. Carlos Hernández-Monteagudo;
Qualification: Outstanding;

2014–2017 **Master Degree** in Astrophysics and Cosmology

Institution: Università Alma Mater Studiorum, Bologna, Italy
Thesis: Testing the methods to reconstruct and model the Baryonic Acoustic Oscillations of different tracers using N-body simulations (link);
Supervisors: Prof. Dr. Lauro Moscardini, Dr. Federico Marulli, Dr. Alfonso Veropalumbo;
Final mark: 110/110;

2011–2014 **Bachelor Degree** in Astronomy

Institution: Università Alma Mater Studiorum, Bologna, Italy;
Thesis: Materia degenere: fisica e applicazioni astrofisiche, (link);
Supervisor: Prof. Dr. Daniele Dallacasa;
Final mark: 109/110;

Research Interests

My research interests lie in the interface between cosmology and astrophysics. I aim to answer fundamental questions such as the nature of dark matter and dark energy, the validity of General Relativity at the largest scale of the Universe, and the physics of the formation of galaxies. To do so, I analyse multi-wavelength maps of the large-scale structure of the Universe using Bayesian inference. I optimise the extraction of information by developing new non-linear methods, which combine cosmological simulations, theoretical models of astrophysics, and machine learning techniques.

Publications

I have published more than 25 papers in international peer-reviewed journals (6 as first author), with over 1500 citations and an H-index of 18 (source: SAO/NASA ADS).
You can find the complete list here.
A selection of 5 papers:

- Giovanni Aricò and Raul E. Angulo (Oct. 2024). "Baryonification extended to thermal Sunyaev Zel'dovich". In: *Astronomy and Astrophysics* 690, A188, p. 10. DOI: 10.1051/0004-6361/202451055. arXiv: 2406.01672 [astro-ph.CO]
- Giovanni Aricò, Raul E. Angulo, Matteo Zennaro, Sergio Contreras, Angela Chen, and Carlos Hernández-Monteagudo (2023). "DES Y3 cosmic shear down to small scales: Constraints on cosmology and baryons". In: *A&A* 678, A109. DOI: 10.1051/0004-6361/202346539. arXiv: 2303.05537 [astro-ph.CO]. URL: https://doi.org/10.1051/0004-6361/202346539
- Giovanni Aricò, Raul E. Angulo, and Matteo Zennaro (Apr. 2021). "Accelerating Large-Scale-Structure data analyses by emulating Boltzmann solvers and Lagrangian Perturbation Theory". In: *Open Research Europe* 1:152, arXiv:2104.14568, arXiv:2104.14568. DOI: https://doi.org/10.12688/openreseurope.14310.1. arXiv: 2104.14568 [astro-ph.CO]
- Giovanni Aricò, Raul E. Angulo, Sergio Contreras, Lurdes Ondaro-Mallea, Marcos Pellejero-Ibañez, and Matteo Zennaro (Sept. 2021). "The BACCO simulation project: a baryonification emulator with neural networks". In: *Monthly Notices of the Royal Astronomical Society* 506.3, pp. 4070–4082. DOI: 10.1093/mnras/stab1911. arXiv: 2011.15018 [astro-ph.CO]
- Giovanni Aricò, Raul E. Angulo, Carlos Hernández-Monteagudo, Sergio Contreras, and Matteo Zennaro (May 2021). "Simultaneous modelling of matter power spectrum and bispectrum in the presence of baryons". In: *Monthly Notices of the Royal Astronomical Society* 503.3, pp. 3596–3609. DOI: 10.1093/mnras/stab699. arXiv: 2009.14225 [astro-ph.CO]

Conferences, Workshops, Schoolds

I have presented my work at more than 40 international events, including conferences, workshops, schools, and seminars. You can find the complete list here. A selection of 10 presentations:

- Invited lecturer at the Cosmology School COLOURS, Institute Pascal, Paris *2-13/06/2025*;
- Invited plenary talk and chair of session at the workshop "Early and Late Universe Cosmology", University Paris-Saclay, *18-22/11/2024*;
- Invited talk and chair of session at the workshop Baryons in the Universe, Kavli IPMU Tokyo, *8-12/04/2024*;

- Invited seminar at the CosKASI Early Career Researcher series, Korea Astronomy and Space Science Institute, Daejeon, *5/10/2023* (youtube link);
- Invited expert in the panel discussion: The State of S_8 in 2023, Cosmology from Home conference, *3-14/07/2023* (youtube link);
- Invited talk at the Cosmology Talk series, *09/04/2023* (youtube link);
- Invited plenary talk at the online conference Cosmology from Home, *04-15/06/2022* (youtube link);
- Talk at the FoF conference, IATE/OAC of Córdoba, Argentina *18-22/04/2022* (youtube link);
- Invited seminar at ICS, University of Zurich, *08/04/2022* (youtube link);
- Invited seminar at ICCUB Barcelona, *12/06/2021* (youtube link);

Visiting

- Donostia International Physics Center, Donostia/San Sebastian, *6-22/07/2025*;
- Beecroft Institute for Particle Astrophysics and Cosmology, University of Oxford, *16-26/02/2024*;
- Max Planck Institut für Astrophysik (MPA), Garching bei München, *01/10-30/11 2020*;
- Kavli Institute for the Physics and Mathematics of the Universe (IPMU), University of Tokyo, *15-25/04/2023; 05-21/04/2024*;
- Centro de Física del Cosmo de Aragón, Teruel, *01/07-31/08 2016*;

Technical expertise

Operative Systems
Linux, Mac OS, Windows; Certificate of basic cyber security;
Programming languages

Python, C/C++, Fortran, SQL, IDL, Julia (beginner);

Software
TensorFlow, Keras, MPI/OpenMP, Gadget, pkdgrav3, CLASS, CAMB, Healpix, LaTeX,
Matplotlib, numpy, scipy, emcee, multinest, polychord, IRAF, CASA;

HPC
I have a long experience operating with several high-performance computer facilities, from small to very large computer clusters; I list following the projects I hae led:

- P.I. at Marenostrum (BSC), AECT-2025-2-0044 "Constraining cosmology and astrophysics with emulators of the large-scale structure of the universe", 6.0 million CPU hours awarded;
- P.I. of the Euclid Emulator 3 simulation project, which employed 72 million core hours on the Alps machine of the Swiss National Computer Centre (CSCS);
- Co-P.I. at Marenostrum (BSC) AECT-2022-1-0025 "Towards constraining neutrino mass from galaxy clustering measurements", 2.5 million CPU hours awarded;

- Co-P.I. at Marenostrum (BSC) AECT-2019-2-0012 “Numerical simulations of the large-scale structure in the Universe”, 8.1 million CPU hours awarded;

Languages

Italian (mother tongue), English (proficient), Spanish (proficient), Euskera (beginner);

Memberships and Professional Activities

- Leader of the Euclid Joint Key Project 4, constraining baryonic effects with Euclid DR1 (2025-now);
- Coordinator of the Baryonic Physics Work Package within the Euclid Consortium, Cosmo-Sims SWG (2024-now);
- Member of the Euclid Consortium: Cosmological Simulation Working Group, IntraScienceTaskforce:NonLinear;
- External collaborator of the Dark Energy Survey Consortium;
- Member of Equality Committee of the Donostia International Physics Center, which implemented the first Gender Equality Plan in the centre (2020-2021);
- Member of the American Physical Society Inclusion, Diversity, and Equity Alliance (2020-2021);
- Reviewer for Monthly Notices of the Royal Astronomical Society, The Astrophysical Journal, and The Open Journal of Astrophysics;
- Member of the Local Organise committee at the workshop CosmoLSS - Cosmology with the LSS, DIPC, Donostia, *15-18/05/2023*;
- Invited panellist at the public event ”Climate, Astronomy, and Extreme events” (Reggio Calabria, 27/12/2023);
- Scientific collaborator of the inclusive astronomy exhibition STRØM, Passion for Knowledge (Donostia, 2-7/10/2023);
- Collaborator of the LOC of the XXVI International Remote Astronomy Olympiads (IRAO) (15-24/10/2022);
- Several outreach activities in primary schools, astronomical observatories/planetaria, and astronomical events;
- University tutor in physics and programming, University of Bologna, 2016-2017;

Honors and Awards

- Centro de Física del Cosmo de Aragón summer fellowship 2016;
- Member of the Italian team in the XII and XIV International Astronomy Olympiads (IAO);
- Two times Italian Astronomy Olympiad winner, editions of 2007 and 2009;

- Giovanni Schiaparelli National Award for Astronomy, 2009;

Links

- ORCID;
- Google Scholar;
- Website;
- Web of Science;
- Linkedin;
- Github