



Andrea Bracco

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<https://github.com/abracco/cosmicodes> 📍 **Address:** 34bis Avenue Édouard Vaillant,
93500, PANTIN, France (Home)

ABOUT MYSELF

I am Junior Professor in Astrophysics at Paris Observatory with particular focus on observational data analysis and numerical models on the following subjects: Magnetic fields; Interstellar medium; Star formation; The Milky Way; Cosmological foregrounds; Polarization.

I am involved in academic research, tutoring of students, and outreach experiences.

I am highly qualified in data analysis, statistical methods, computer programming, and image processing.

Since March 17, 2022 I am father of a beautiful child called Elio.

WORK EXPERIENCE

LUX - Paris Observatory - Paris

Chair Professeur Junior

[01/02/2026 - Current]

Junior professor and PI of the **MAGNIFIER** (**MAG**Netized **ISM** and **Feed**back **Inter**actions **Exp**lored in the **R**adio **b**and) project (200 kEuro) to study galactic magnetic fields in the interstellar medium with next-generation radio data and state-of-the-art numerical and analytical models. Teaching, research, and supervision!

Osservatorio Astrofisico di Arcetri - Italy, Florence

IAF Research fellow

[01/10/2023 - 31/01/2026]

Principal Investigator of the INAF-Astrophysics fellowship MEGASKAT. Data analysis of low-frequency radio polarization observations to study cosmic magnetism (NenuFAR, LOFAR, CHIME, DRAO, ASKAP). Development of synthetic models of radio emission in the context of SKA.

Co-supervisor of one PhD student (Jack Berat) in collaboration with LPENS in Paris. Project scientist for the SKA Regional Centre Network.

Laboratoire de Physique École Normale Supérieure (LPENS) - France, Paris

Postdoc

[31/01/2022 - 30/09/2023]

Data analysis and theoretical interpretation of polarization observations in the radio band (e.g., LOFAR).

Models of Galactic synchrotron emission and Faraday rotation. Supervisor: Edith Falgarone. Fundings: ERC-MIST.

Co-tutoring with Marc-Antoine Miville-Deschênes (LPENS) one Master student (Jack Berat) from "M2 Astronomie et Astrophysique" of University Paris-Saclay and three Master students from "Ecole des Mines".

Rudjer Bosković Institute (RBI) - Croatia, Zagreb

Marie-Sklodowska-Curie fellow (IF)

[31/01/2020 - 30/01/2022]

Principal Investigator of the MSC Action grant agreement No. 843008.

Observational data analysis and analysis of numerical simulations of diffuse polarized emission in the Milky Way detected at radio wavelengths with LOFAR. Detailed study of the multiphase and magnetized Galactic interstellar medium.

Co-tutoring with Vibor Jelić (RBI, Zagreb, Croatia) two Master students (Barbara Šiljeg, and Luka Matijević) from University of Zagreb (Croatia).

Several online outreach experiences and astrophysics lectures (University of Zagreb) during Covid pandemics.

Laboratoire de Physique École Normale Supérieure (LPENS) - France, Paris

Postdoc

[31/10/2018 - 30/01/2020]

Data analysis and theoretical interpretation of polarization observations in the sub-millimetre domain.

Supervisor: Francois Boulanger. Fundings: ANR-BxB.

Organization of the biweekly AstroLunch journal club.

Co-tutoring with Francois Boulanger (LPENS, Paris, France) and Vibor Jelić (RBI, Zagreb, Croatia) one Master student (Marta Colakovic-Benceric) from University of Zagreb (Croatia).

NORDITA - Sweden, Stockholm

Postdoc

[30/09/2017 - 29/09/2018]

Study of theoretical models for the characterization of interstellar magnetic fields in the Milky Way, magnetic helicity, and Galactic foregrounds to the cosmic microwave background. Supervisor: Axel Brandenburg.

CEA-Saclay, Institut de recherche sur les lois fondamentales de l'Univers (Irfu) - France, Gif-sur-Yvette

Postdoc

[31/03/2015 - 29/09/2017]

Data analysis of infrared data from interstellar dust (NIKA instrument at IRAM-30m) in the Milky Way.

Commissioning of the sub-millimetre camera NIKA2 (installed at IRAM-30m) in polarization.

Planning of the NIKA2 large observational program "B-FUN" on the study of magnetic fields in molecular clouds.

Design of the European/Japanese infrared space mission SPICA.

Supervisor: Philippe André

Institut d'Astrophysique Spatiale (IAS) - France, Orsay

Postdoc

[31/12/2014 - 30/03/2015]

Finalizing works derived from the PhD thesis. Supervisor: Francois Boulanger. Fundings: ERC-MISTIC.

University of California Irvine (UCI) - United States, Irvine

Visiting researcher

[31/01/2010 - 30/08/2010]

Data analysis of infrared data from interstellar dust (Galactic cirrus) detected by the Herschel satellite.

Supervisor: Asantha Cooray

EDUCATION & TRAINING

PhD

University Paris XI, Institut d'Astrophysique Spatiale [30/11/2011 - 15/12/2014]

Address: Bât 120 – 121 Univ. Paris XI 91405 , Orsay (France) | **Website:** <https://www.ias.u-psud.fr/> | **Field(s) of study:** Astrophysics: | **Thesis:** Statistical properties of the Galactic magnetic field observed with the Planck satellite

Data analysis and interpretation of first all-sky polarization maps at sub-millimeter wavelengths from the Planck satellite. Characterization of statistical properties of the Galactic magnetic field based on interstellar dust emission. Models of Galactic emission for foreground contamination in the context of the cosmic microwave background polarization.

Supervisor: Francois Boulanger.

M.S. ("Laurea Specialistica")

Università di Roma "La Sapienza" [30/09/2008 - 23/11/2011]

Address: Piazzale Aldo Moro, 500185 , Roma (Italy) | **Field(s) of study:** Astronomy and Astrophysics: | **Final grade:** 110/110 cum laude | **Thesis:** 'Statistical Properties of Galactic Cirrus in the GAMA-9 hour Science Demonstration Phase Field'

Data analysis of infrared data from the Herschel satellite of Galactic cirrus at high Galactic latitudes. Supervisor: Alessandro Melchiorri.

B.S. ("Laurea Triennale")

Università di Roma "La Sapienza" [31/08/2005 - 27/11/2008]

Address: Piazzale Aldo Moro, 500185, Roma (Italy) | **Field(s) of study:** Physics and Astrophysics: | **Final grade:** 110/110 cum laude | **Thesis:** Formation of large scale structures

Summary of the basic concepts behind the formation of large-scale structures in the cosmological standard model.

Supervisor: Alessandro Melchiorri.

LANGUAGE SKILLS

Mother tongue(s): Italian

English

LISTENING: C2 **READING:** C2 **WRITING:** C2
SPOKEN PRODUCTION: C2
SPOKEN INTERACTION: C2

French

LISTENING: C2 **READING:** C1 **WRITING:** B2
SPOKEN PRODUCTION: C1
SPOKEN INTERACTION: C1

SKILLS

Microsoft Word | Microsoft Excel | Adobe Photoshop | Programming: C programming, Python Programming | Programming (Fortran) | IDL language | Github Actions | Windows Linux OS | Microsoft Windows and macOS

HONOURS AND AWARDS

[31/12/2024]

Qualification aux fonctions de maître de conférences, French qualification for academic teaching. 2024

[31/12/2023] INAF

IAF fellowship (astrofit) MEGASKAT project (title: "Mastering Galactic Synchrotron in the SKA time") Period:

2023-2026, at Osservatorio Astrofisico di Arcetri, Florence, Italy.

[30/12/2021]

Best publication award 2020 from the Rudjer Bosković Institute (Croatia).

[30/12/2021]

Abilitazione scientifica nazionale (ASN) 02/C1, Italian qualification for academic teaching.

[30/12/2019]

Marie Skłodowska Curie individual fellowship MUSICA project (title: "origin of Magnetic strUctures in the ISM obscurIng the Cosmic dAwn"), € 147,463.68, Period: 2020-2022, at Rudjer Bošković Institute, Zagreb, Croatia.

[30/12/2019]

"Cosmologie et structuration de l'Univers" Action of the Paris Observatory (€ 2,500).

[30/12/2018]

"Gruber Cosmology Prize 2018", as a core-team member of the Planck Collaboration

[30/12/2016]

Seal of Excellence, MSC proposal 2016.

[30/12/2016]

Qualification aux fonctions de maître de conférences, French qualification for academic teaching.

[30/12/2009]

AST (Italian federate Athenaeum of Science and Technology). Grant for master thesis abroad (€ 2,821).

[30/12/2008]

ENEA (Italian national agency) University merit-based grant of € 600

[30/12/2007]

ENEA (Italian national agency) University merit-based grant of € 568

[30/12/2006]

ENEA (Italian national agency) University merit-based grant of € 568

TEACHING & TUTORING

Important note

Although I have held several postdoctoral positions in France, Sweden, Croatia, and Italy, frequent travels, language barriers, and full-time commitments (e.g., ERC postdoc, MSC-IF, IAF Fellowship) have prevented me from officially teaching a university class. Nonetheless, I have consistently shared scientific knowledge through *teaching, student supervision, and outreach*. I also volunteered as a lecturer in ISM physics and led hands-on workshops at summer schools.

Supervisor of PhD students

2022 - 2025: Jack Berat (LPENS) in collaboration with Marc-Antoine Miville-Dechénes. Thesis subject: "Modelling Galactic synchrotron emission at low frequency".

We are investigating with numerical models recent observations of the diffuse and magnetized interstellar medium (ISM) in the Milky Way that revealed correlations between tracers of the cold and dusty ISM and synchrotron emission.

Supervisor of master students

2024: Co-supervision of a master student at INAF-Arcetri with M. Padovani (Alexandre Cipriani from LPENS). The student produced analytical derivations for estimating the impact of synchrotron self absorption, free-free

absorption, and the Razin-Tsytoich effect on the synchrotron radiation observed at metre wavelengths. The work was published in Bracco et al. 2024b.

2022 - 2023: Supervisor of three master students from the Ecole des Mines de Paris (Timothé Schimdt, Victoire Celarier, Eliot Reynal). Despite the little background in astronomy, all students successfully completed their internships. TS and VC worked on the assessment of methodological biases on the magnetic-field estimate using the Davis-Chandrasekhar-Fermi method with dust polarization. ER derived morphological properties of LOFAR polarization data tracing synchrotron radiation.

2022: Co-supervision with Marc-Antoine Miville Deschênes (CEA/Saclay) of one master student (Jack Berat) from Paris-Saclay University on the development of numerical codes to model synchrotron radiation from 3D magnetohydrodynamical simulations of the interstellar medium.

2019 - 2021 : Co-supervision with Vibor Jelić (RBI, Croatia) of three master students (Marta Colakovic-Benceric, Barbara Šiljeg, and Luka Matijević) of the University of Zagreb. MCB studied the properties of depolarization structures in the LOFAR data called depolarization canals. BS studied methodological biases related to the measure of neutral gas column densities in the ISM using the ROHSA code applied to MHD simulations of the diffuse ISM. LM produced synthetic models of synchrotron emission from MHD simulations of thermally unstable ISM.

[Current]

Summer school hands-on supervisor

2025: I will be hands-on supervisor for the GISM3 2025 summer school.
(<https://ismgalaxies2025.sciencesconf.org/>)

2021: Two-week hands-on supervisor for the GISM 2021 summer school (5 students).
<https://ismgalaxies2021.sciencesconf.org/>

These students worked on low-frequency polarized data from the LOFAR telescope and learned how to process them to extract information on the Galactic magnetic field using Faraday tomography.

[Current]

Astrophysics lecturer

2025: I will be lecturer for the GISM3 2025 summer school with the title "The radio wavelength ISM / galaxy science" (<https://ismgalaxies2025.sciencesconf.org/>)

2023: In December 2023, at Université Paris-Saclay, I lectured on the formation of structures in the Galactic ISM as part of the methodology course (M04) for the Master 2 Astronomy and Astrophysics program at Université Paris-Saclay (led by P. Guillard and E. Habart). 2 hours.

2020: Lectures on the physics of the interstellar medium at the University of Zagreb within the class of "Galaxies" directed by Vibor Jelic (RBI, Croatia). 3 hours.

[Current]

Teaching assistant

2025: From February 2025 to June 2025 I was teaching assistant for the class "Introduction à l'Astrophysique" at LPENS (led by F. Levrier). 20 hours.

2014: Teaching assistant at University Paris-Sud (XI) for 'Methodologie en Cosmologie' (Computational methods in Cosmology) in the context of the Master 2 NPAC. 40 hours.

SCIENTIFIC OUTREACH

[2021]

Lecturer

Lecture at the "Waldeck Rousseau" primary school in Les Lilas (Paris, France). "The polarization of light". 2

hours.

[2019 - 2021]

Volunteer for "open days" of European research

Active participation to the "Open days" of European research at Rudjer Bošković Institute in Zagreb (Croatia).

Link: <https://odi2021.irb.hr/Zoom-pokusi>.

[2018 - 2021]

Speaker and creator of "Nébuleuse"

"Nébuleuse", outreach program in Astronomy in collaboration with Radio Royans in France and the ChänChän music group.

Link: <https://radioroyans.fr/evasions-sonores-et-loisirs/nebuleuse>

[2020]

Oral contribution

Online oral contribution for the Italian association of amateur astronomers "Astronomiamo", title: "Un breve viaggio tra le nubi interstellari fino all'Arco dell'Orsa Maggiore".

Link: <https://www.astronomiamo.it/Home>

[2020]

Art & Science exhibition

Art exhibition on the discovery of the solar system "Stellae Corpus"

Link: <http://carnetdulointain.wixsite.com/carnetdulointain/parcours>

RESPONSIBILITIES & ORGANIZATION

[12/05/2025 - Current]

SKA Regional Centre Network (SRCNet) Project Scientist

Project scientist for the SKA Regional Centre Network (SRCNet), ensuring that the scientific goals of the SRCNet are achieved. Define and uphold the scientific objectives of the SRCNet. Ensure that the design and construction of the SRCNet meet the requirements needed for research in Galactic science.

[2023 - 2024]

Jury member

Member of the jury for the master 2 class "Méthodologie" (M04) in Astronomy and Astrophysics at Paris-Saclay University. In charge both in 2023 and 2024.

[Current]

Writing observational proposals

I have been contributing to the realization of several observational proposals accepted by the following international facilities: IRAM-30m (2), LOFAR (2), ATCA (1), Mopra (1), PARKES (2), Nobeyama (1), ALMA (1), BLAST-TNG (1).

[2021 - Current]

Coordinator of the LOFAR survey (LoTSS) data of the Taurus-Perseus molecular complex

I am responsible for the data analysis and publication of LoTSS toward molecular clouds in the solar neighborhood.

[2015 - Current]

Referee for scientific journals

Several referee experiences for the following journals: Astronomy & Astrophysics (A&A), the Astrophysical Journal (ApJ), Nature Astronomy, Monthly Notices of the Royal Astronomical Society (MNRAS).

[22/09/2025 - 26/09/2025]

Conference organizer - LOC

Member of the LOC of the LOFAR Family meeting 2025 (<https://indico.lofar.eu/event/24/>)

Link: <https://indico.lofar.eu/event/24/>

[23/06/2025 - 27/06/2025]

Member of the SOC of the Special Session SS6 at the European Astronomical Society (EAS) meeting 2025.

A panoptic view of the solar neighborhood: new insights into the nearest ISM laboratory.

Link: <https://eas.unige.ch/EAS2025/session.jsp?id=SS6>

[11/2024]

Conference organizer - chair - SOC and LOC

Organizer of the five-day conference held at Scuola Normale Superiore (SNS) in Pisa (Italy) called "Cosmic magnetism with radio astronomy (COMRAD) 2024" supported by INAF (grant: 10000 euro) and SNS (contribution of 3000 euro).

Link: <https://comradconf.wixsite.com/comrad24>

[10/2023]

Workshop organizer - chair - SOC and LOC

Organizer of the two-day workshop « Revealing cosmic magnetism in the near future: new insights from the radio sky » supported by the Action Spécifique CNRS SKA-LOFAR (grant: 5000 euro). The workshop was hosted at LPENS.

Link: <https://cosmaglowf23.sciencesconf.org/>

[12/2022]

Workshop organizer - chair - SOC and LOC

Organizer of the two-day workshop « Revealing cosmic magnetism in the near future: promises and challenges of Faraday rotation » supported by the Action Spécifique CNRS SKA-LOFAR (grant: 5000 euro). The workshop was hosted at LPENS.

Link: <https://cosmaglowfreq.sciencesconf.org/>

[2019 - 2022]

Co-organizer of the journal-club seminars at Rudjer Boskovic Institute (Croatia).

[07/2022]

Member of the SOC of "INTERSTELLAR INSTITUTE 2022 - WITH TWO EYES"

Link: <http://interstellarinstitute.org/programs/with-two-eyes/>

[2019]

Organizer of the Astro-Lunch journal club seminars at LPENS (Paris).

[2018]

Member of the SOC of the focus meeting (FM4) on magnetic fields in star formation during the 2018 IAU General Assembly

Link: <http://escience.aip.de/iau30-fm4/>

OBSERVATIONAL EXPERIENCE

[2022 - Current]

NenuFAR

PI of 244 hours of observations between 50 and 80 MHz with NenuFAR of diffuse Galactic emission in total and polarized intensities to investigate the energy distribution of cosmic ray electrons in the Galaxy and its magnetic-field strength.

[2018 - Current]

Parkes telescope

PI, together with J. Dawson, of ongoing observations (170 hours) with the Parkes telescope, on the origin of translucent molecular clouds in the diffuse interstellar medium to follow the atomic-to-molecular transition.

[2017 - Current]

BLAST-TNG

PI of one accepted proposal (17.5 hours) with the BLAST-TNG balloon-borne experiment for far-infrared polarization measurements of a star-forming region. Postponed for technical problems of the balloon.

[2015 - Current]

NIKA2 at IRAM 30m

2022 - present, Probing the B-field in star-forming Filaments with NIKA2-Pol (B-FUN), 300h. Large program directed by Ph. André (CEA/Saclay).

2015 - 2017, 3 weeks of commissioning for the NIKA2 mm-camera (total intensity and polarization) at IRAM-30m telescope (Granada, Spain). Experience in the acquisition process of the data and in their preliminary reduction through the pipeline.

[2013]

IRAM 30m

53 hours as co-PI for radio spectroscopic observations at IRAM-30m telescope (Granada, Spain), 'Probing the formation of filamentary and clumpy structures in the Polaris flare', PI: D. Arzoumanian

SCIENTIFIC CONTRIBUTIONS (IN SHORT)

64 publications in international refereed journals, 13 as first author, 2 conference proceedings.

Astrophysics Data System (ADS): 3486 citations, h-index: 28.

[Current]

62 scientific contributions in international conferences (18 invited talks, 2 as SOC member, 3 as main organizer)

21 invited seminars in international institutes.

6 participations in international schools and programs.

SCIENTIFIC COLLABORATIONS

[2019 - Current]

Square Kilometre Array Observatory (SKAO)

I am a member of the SKAO collaboration in several working groups (SWG, magnetism, our galaxy, cradle of life). I contributed to the definition of the scopes of the magnetism SWG (Heald et al. 2020). I prepared the Galactic synchrotron models included into the data challenge number 3 as a proxy for Galactic foregrounds to the EoR (Bonaldi et al. submitted). I will lead a chapter of the new SKA science book.

In May 2025 I became Project Scientist for the SKA Regional Centre Network (SRCNet).

[2023 - Current]

Polarisation Sky Survey of the Universe's Magnetism (POSSUM)

I am part of the ASKAP-POSSUM *collaboration* (polarization survey with ASKAP). My role is to develop statistical tools for analyzing Faraday rotation data. The paper presenting the POSSUM survey is currently under revision [Anderson et al. submitted].

[2020 - Current]

Galactic Magneto-Ionic Medium Survey (GMIMS)

I am part of the Galactic Magneto Ionic Medium Survey (GMIMS) collaboration that puts together radio data between 300 MHz and 1.8 GHz from the Parkes telescope in the southern hemisphere and the Dominion Radio Astrophysical Observatory (DRAO) and the CHIME telescope in the north. My role consists of providing support to data analysis, writing of official documents (scientific papers and reports).

[2019 - Current]

Low Frequency ARray (LOFAR)

In the LOFAR collaboration I am the reference for the analysis of the Galactic polarized and total emission and I am coordinating the analysis of the survey in the Taurus-Perseus molecular complex. I took part in the writing and discussion of 4 collaboration papers. I am involved in the statistical characterization of the LOFAR polarized intensity as a foreground signal to the detection of the HI line emission from the EoR.

[2014 - Current]

NIKA2

In the NIKA2 collaboration, I was a member of the core team in the first stages of the instrument commissioning. I am now part of the B-FUN large program. I have been participating in observational campaigns and I will take part in data reduction and analysis. I led one work on the analysis of interstellar dust properties in Taurus using the NIKA2 prototype. I took part in the writing and discussion of 5 collaboration papers. My role consists of providing support to data analysis, instrumental commissioning, writing of official documents (scientific papers and reports).

[2011 - 2020]

Herschel satellite

Within the Herschel collaboration I played a major role in the zero-offset calibration of the data for the Herschel Gould Belt Survey (HGBS). I took part in the writing and discussion of 4 collaboration papers, and 1 as a main author to study interstellar dust properties.

[2011 - 2020]

Planck satellite

In the Planck collaboration my role has been focused on the data analysis of the first-ever all sky maps of thermal dust polarization as part of the High Frequency Instrument (HFI) Galactic ISM group. I led 2 collaboration works and participated in the writing and discussion of 11 collaboration papers.

RECOMMENDATIONS

Name: Marco Padovani | Collaborator

Ricercatore di III livello at INAF-Osservatorio di Arcetri, Florence, Italy

Email: marco.padovani@inaf.it | **Phone:** +39 3425969211

Name: Marc-Antoine Miville-Dechênes | Collaborator

CNRS director of research at Laboratoire de Physique de l'École Normale Supérieure, Paris, France.

Email: marc-antoine.miville-deschenes@cnrs.fr | **Phone:** +33 661856723

Name: Vibor Jelić | Team leader

Senior researcher associate at Rudjer Bosković Institute, Zagreb, Croatia

Email: vibor@irb.hr | **Phone:** +385 915233572

Name: Francois Boulanger | PhD advisor

CNRS director of research at Laboratoire de Physique de l'École Normale Supérieure, Paris, France.

Email: francois.boulanger@phys.ens.fr | **Phone:** +33 679170204

VOLUNTEERING

[2015 - 2017] Paris (France)

Peniche du coeur In charge of coordinating one group of volunteers for the French charity association "Peniche du coeur".

Link: <https://www.restosducoeur.org/date-cle/peniche-du-coeur/>

[2018] Stockholm (Sweden)

Cyklopen Support to the needs of the Swedish cultural association Cyklopen. School support and organization of events.

Link: <https://cyklopen.se/>

HOBBIES AND INTERESTS

Photography

Link: <https://www.lensculture.com/andrea-bracco>

Sport - (Basketball, soccer, swimming, running, beach volley) I have been playing in basketball and soccer teams since my childhood, which taught me the importance of teamwork and leadership.

Music player: Guitar, Didjeridoo, Piano

DRIVING LICENCE

Driving licence: B

24/12/2014 - 14/07/2025

ORGANISATIONAL SKILLS

Collaboration and teamwork

I have excellent interpersonal skills developed during my scientific career and related to teamwork. I have successfully organized regular meetings for scientific purposes in the research institutes I worked.

I had positions of organizational responsibility in both scientific and associative contexts. These experiences have made me capable of managing the work of groups of people and/or students for collaborative purposes and scientific investigation.