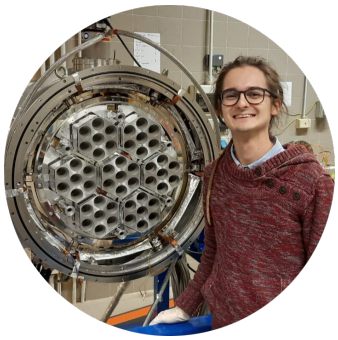
Francesco Andreetto

PhD Student at Department of Physics and Astronomy "Augusto Righi" of Bologna



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GitHub Profile
Youtube Channel

Scientific interest

I am a PhD student at the Department of Physics and Astronomy of the University of Bologna, Italy.
My supervisor is Prof. Leonardo Testi and my co-supervisor is Prof. Veronica Roccatagliata.
My PhD project focuses on studying the properties of young planets in Class I disks through VLT observations. Currently, I am working with CRIRES+ data to analyze the accretion characteristics of material from protoplanetary disks onto young stars.

My scientific activity also includes instrumental aspects of the ALMA-ECOGAL project. In particular, I am involved in testing active and passive components of the Band 2 cartridges, in collaboration with the European Southern Observatory (ESO) in Garching bei München and the Cryowaves Laboratory at INAF-OAS in Bologna.

In 2024 I won a research fellow at the Department of Physics and Astronomy of the University of Bologna where I started working on the ALMA-ECOGAL project.

During my studies at University "La Statale" of Milan, I attended several courses concerning astronomical and astrophysical topics that I consider fundamental for my accademic background: stars formation and evolution, compact objects physics, galactic and extra-galactic phenomena, CMB and cosmology. Then, starting from my Bachelor's thesis and the following working experiences, my scientific path evolved, focusing more on experimental aspects linked to the CMB: I acquired skills concerning systematic effects and behaviours in microwaves instrumentation, I learned more on scientific data interpretation and analysis, development of the procedures for the tests of microwaves components and control of the instrumentation.
In 2022, I attended a semester at "Albert-Ludwigs-Universität" of Freiburg im Breisgau (Germany) with the aim of enriching myself culturally, improving my adaptive skills with a foreign language and acquiring knowledge of different fields of the Physics. For this reasons, I decided to include Advanced Particle Physics and Multi-Junction Solar Cells Physics in my study plan abroad.
Finally, in January 2023 I did an internship at INAF-OAS Cryowaves Laboratory, where I had the opportunity to see in person and partecipate in some activities of the researchers during the functional verification campaign of the Large Scale Polarization Explorer - Strip instrument (aimed at studying the Cosmic Microwave Background) ongoing at INAF-OAS, and I acquired knowledge and skills concerning microwaves technology and astrophysical instrumentation: feedhorns, Low Noise Amplifiers (LNAs), microwave passive components, connectors, thermal sensors, polarimeters and microwaves components in general.

Themes: Astrophysics, Astronomy, Data Analysis, Astrophysical Instrumentation, CMB, Cosmology, Low Noise Amplifiers.

Education

PhD in Astrophysics — November 2024 – Ongoing

Department of Physics and Astronomy (DIFA) "Augusto Righi", University of Bologna, Italy

Thesis title: "**Detection and properties of young exoplanets using the VLT**"
Supervisors: Prof. Leonardo Testi (UniBo), Prof.sa Veronica Roccatagliata (UniBo)
Description of the activities: My PhD project focuses on studying the properties of young planets in Class I disks through VLT observations. Currently, I am working with CRIRES+ data to analyze the accretion characteristics of material from protoplanetary disks onto young stars.

My scientific activity also includes instrumental aspects of the ALMA-ECOGAL project. In particular, I am involved in testing active and passive components of the Band 2 cartridges, in collaboration with the European Southern Observatory (ESO) in Garching bei München and the Cryowaves Laboratory at INAF-OAS in Bologna.

Bachelor's Degree in Oboe — November 2023

Conservatory "Luca Marenzio" of Brescia

Thesis title: "**Esattezza numerica e dolore in Johann Sebastian Bach. I colori dell'oboe nei concerti BWV1060R e BWV1059R e del corno inglese nella sonata BWV1028.**"
Supervisors: M° Luca Morassutti, M° Roberto Bertazzi
Final mark: 110 cum Laude/110

Master's Degree in Physics
Specific Curriculum in Astrophysics — March 2023

Department of Physics "Aldo Pontremoli", University "La Statale" of Milan

Thesis title: "**Development of the pipeline for functional verification of the LSPE-Strip instrument**"
Supervisors: Prof. Maurizio Tomasi (Unimi), Dr. Francesco Cuttaia (INAF-OAS Bologna)
Final mark: 110 cum Laude/110
Description of activities: developement of a solid pipeline written in Python for the functional verification of all the principal components of the instrument Strip. The pipeline was able to produce handy reports in csv and html format (using the library *Jinja 2*), in which the main results were stored. This allowed to analyze the timeline acquired by Strip underlying the behaviour of the scientific data, of the thermal sensors measures and of the housekeeping parameters acquired. The pipeline helped to have a better characterization and representation of the whole instrument, by computing correlations between polarimeters, bias housekeeping of the LNAs and thermal measures. To have a clean and usable information, the pipeline produced some synthetic tables with the statistics of all the measures and all the anomalous behaviour faced in the analysis. The current version of the pipeline for the functional verification of LSPE-Strip can be found at this link.

Bachelor's Degree in Physics — June 2020

Department of Physics "Aldo Pontremoli", University "La Statale" of Milan

Thesis title: "**Strip-LSPE: analisi di funzionalità al variare della modalità di biasing degli amplificatori**"
Supervisors: Prof. Maurizio Tomasi (Unimi), Dr. Francesco Cuttaia (INAF-OAS Bologna)
Final mark: 100/110
Description of activities: analysis of the scientific dataset produced by the instrument LSPE-Strip during the integration test campaign in 2020. Development of tools in Python able to characterize the scientific signal of the instrument in two different configurations, depending on the different modality of biasing of the Low Noise Amplifiers of the receivers. The analysis scripts that I wrote produced interesting results both in time domain and frequency domain, becoming a powerful instrument for the diagnostic of the anomalies in the behaviour of Strip.

Diploma di Liceo Scientifico — July 2016

Liceo Scientifico "Franco Moretti", Gardone Val Trompia (Italy)

Topic title: **"Enigma, il mistero della macchina"**
Final mark: 97/100

First Certificate

November 2015

Cambridge English Level 1 Certificate in ESOL International

Reading: 176/190 Use of English: 187/190 Writing: 160/190
Listening: 167/190 Speaking: 172/190
Final mark: 172/190 **(B2 Level - Grade C)**

Work experiences

Research Fellow
March 2024 – November 2024

Department of Physics and Astronomy (DIFA) "Augusto Righi", University of Bologna, Italy

Research Project: "ECOGAL: Testing and characterization of the Band 2 production cartridges", ALMA collaboration.

Supervisor: Prof. Leonardo Testi (DIFA University of Bologna)

Planned activities: I worked in Bologna at DIFA in tight collaboration with the INAF-OAS Cryowaves laboratory staff and I spend part of my working time in Garching bei Munchen at ESO in the ALMA laboratory. My main responsibilities and duties were:

- Participate in the design and setup of laboratory equipment to test Band 2 production components, specifically the Cryogenic Low Noise Amplifiers and the passive optical components for the ESO facility in Garching (Band 2 microwave test laboratory) and for the Cryowaves Laboratory (INAF-OAS Bologna);
- Support the procurement of the relevant components for the ESO facility (writing of specifications, verification of possible suppliers);
- Execute and support testing campaigns at the European Southern Observatory (ESO) in Garching bei Munchen and in Bologna for the critical components of the Band 2 receiver;
- Participate in system tests in Bologna, ESO or ALMA of the complete receivers to characterize their astronomical performance.
- Optimization/development of software for the analysis of the data of the tests acquired during the verification campaign at ESO and Bologna.

Description of the activities carried out to date
I performed a preliminary training period at OAS in which I studied both the theoretical and practical architecture of ALMA B2, working on the prototype of the instrument. I learned some relevant measurement techniques, functional both for tests at ESO (characterization and optimization of LNAs) and at Bologna (Alma optics, microwave passive elements). Up to now, I participated in two working sessions at ESO in which I assisted the ALMA Band2 Program Manager Dr. Pavel Yagoubov in carrying out the tests on the LNAs chains and I took on the task of rewriting and optimising the codes used for acquisition and data analysis of the tests. I am also planning to participate in the next test campaigns (June-July 2024) and the ALMA meeting at ESO (*"The promises and challenges of the ALMA wideband sensitivity Upgrade"*)

Assignment as scientific collaborator
July 2023 – September 2023

Research support for the project Large Scale Polarization Explorer (LSPE Collaboration), Department of Physics "Aldo Pontremoli", University "La Statale" of Milan, Italy

Project: Large Scale Polarization Explorer (LSPE)–ASI17AMENN_01
Scientific Supervisor: Prof. Aniello Mennella (University "La Statale" of Milan)
Description of activities:

1. Optimization of the Python codes for the data analysis of the instrument Strip of the LSPE Collaboration. The scope was to develop a solid pipeline for the functional verification of the main components of this instrument. The pipeline that I developed is composed by many tools able to monitor the behaviour of the instrument and to perform an analysis in the time domain and in the frequency domain of the following data:
   - Scientific data (*demodulated* and *total power*);
   - Housekeeping parameters used for the biasing of the Low Noise Amplifiers of the polarimeters;
   - Thermal sensors measures acquired inside the cryostat of the instrument.
2. Development of a code to produce handy reports in html, md, and csv format, containing plots, correlation matrices, tables and synthetic results of the analysis of the tests.

Secondary School Teacher — November 2020 – June 2021

I.I.S. "Beretta" of Gardone Val Trompia (BS), Italy

Subject: Teacher of Informatics at the Technology Institute (ITIS) and teacher of Technology of the Information and Communication (TIC) at the Professional Institute (IPSIA).

Music Teacher, Educator and Entertainer — 2018 – Ongoing

C.E.M. – Campo Estivo Musicale

Find all the information about the C.E.M. on the official site.

Oboe Teacher — September 2013 – March 2024

- *Music School "Cico Gottardi" of Gardone Val Trompia (BS), Italy* — September 2013 – June 2023
- *Music School "Isidoro Capitanio" of Brescia (BS), Italy* — September 2019 – March 2024
- *Music Accademy "Giovanni Gabrieli" of Bovezzo (BS), Italy* — September 2022 – June 2023
- *Music School "San Faustino" of Sarezzo (BS), Italy* — September 2022 – June 2023

Competitive Selections

- **Alma Mater Studiorum Università di Bologna** — **17/01/2024**
  Department of Physics and Astronomy "Augusto Righi"
  Winner of the public selection for a PhD position in the XL cycle - A.A. 2024-2025.
  Title of the project "Detection and properties of young exoplanets using the VLT".
  Esito: 80.5/100.
- **Alma Mater Studiorum Università di Bologna** — **17/01/2024**
  Department of Physics and Astronomy "Augusto Righi"
  Winner of the public selection for the award of n.1 research grants within the research project entitled "ECOGAL: Testing and characterization of the Band 2 production cartridges".
  Esito: 83/100.
- **University "La Statale" of Milan** — **26/05/2023**
  Department of Physics "Aldo Pontremoli"
  Winner of the comparative assessment referred to in section n. 02_2023 protocol n. 0020820/23 of 26/05/23. This assessment was made following the public selection n. 02_2023 Rep. n. 8577/2023 of 26/05/2023 in the ambit of the project "Large Scale Polarization Explorer (LSPE)".

Affiliations and Membership

INAF Associate — August 2023 - Ongoing

INFN Associate — November 2022 - November 2023

Fridays For Future Brescia — February 2019 - Ongoing

Cofounder of the local group of the climate activists who fight for Climate Justice and Social Justice. With this group I developed many social skills: I become able to communicate better to people, organizing events, scientific conferences with experts and stikes with 10k+ people.

Music Membership

- **Orchestra di Fiati Brixiae Harmoniae** — **2020 - Ongoing**
  Oboe and English Horn

The OFBH (Orchestra di Fiati Brixiae Harmoniae) is wind orchestra based in Brescia conducted by Maestro Andrea Gasperin and Maestro Giulio Piccinelli. With this ochestra, I won the prestigious International Competition for wind groups "Flicorno D'Oro" in 2023.

- **Banda Cittadina "Isidoro Capitanio" of Brescia** **2022 - Ongoing**
  Oboe and English Horn
- **Banda Cittadina "Cico Gottardi" of Gardone Val Trompia** **2010 - Ongoing**
  Oboe

Conferences and schools

Workshops

- **Promises and challenges of the ALMA wideband sensitivity upgrade @ ESO** June 2024

Schools

- **Scientific Outreach** April 2019 - Ongoing

  I am the responsible of the Scientific Divulgation of the group of activists for climate and social justice of Fridays For Future Brescia. Since 2019 I hold several conferences in the schools of the province of Brescia on the topics of the Climate Crisis.

Conferences and seminars

- **Pomeriggi in San Barnaba**
  Mitigazione e adattamento: strategie per ridurre gli impatti climatici
  Auditorium San Barnaba, Brescia (Italy) 11 April 2023

  Host of the conference on climate crisis, adaptation and mitigation with Prof. Antonello Pasini (First Researcher at CNR Roma, Italy).

Courses and training

- **Driving Licence:** Type B March 2018 - June 2028
- **Corso sulla sicurezza - Formazione Generale** May 2024

Figure 1: Badge Sicurezza Formazione Generale

- **Corso sulla sicurezza - Formazione Specifica** May 2024

Figure 2: Badge Sicurezza Formazione Specifica

Languages

Language	**Comprehension**		**Speaking**		**Writing**
	Listening	Reading	Oral Interaction	Oral Production	
Italian (Mother Tongue)	C2	C2	C2	C2	C2
English	B2	C1	B2	B2	B2
French	B1	B2	B2	B2	B1

Digital Skills

Competences tested at this Europass link.

Computer and digital literacy: Advanced (Level 6)
Communication and collaboration: Advanced (Level 6)
Creation of digital contents: Advanced (Level 6)
Security: Advanced (Level 6)
Problem Solving: Advanced (Level 6)

Programming Language	**Level**
Python	Advanced
C++	Good
D	Base
HTML	Base