

Ilaria Risso

Curriculum Vitae - February 17, 2025



Professional experience

June 2024 – **Postdoc**, INAF Osservatorio Astronomico di Brera, Milano, Italy.
Now

- *Mitigation of observational systematics for the next cosmological spectroscopic surveys.*

2023 – May 2024 **Postdoc**, Università degli Studi di Genova, Genova, Italy.

- *Systematic effects on the galaxy distribution of future surveys and their impact on galaxy clustering measurements.*

Education

2020–2023 **Ph.D. in Physics**, Università degli Studi di Genova, Genova, Italy.

- *Counting pairs in Euclid. The self-calibration observation sequence and the impact of the interlopers on the two-point correlation function.* Supervisors: Prof. Branchini, Dr. Davini, and Prof. Tosi. Defended on March 8, 2024.

2018–2020 **Master Degree in Physics**, Università degli Studi di Genova, Genova, Italy.

- *"Relative flux calibration for the NISP spectrograph of the Euclid mission", 110/100 cum laude.*
Supervisors: Prof. Silvano Tosi and Dott. Stefano Davini.

2015–2018 **Bachelor Degree in Physics**, Università degli Studi di Genova, Genova, Italy.

- *"Bose-Einstein condensation in a harmonic trap", 110/100 cum laude*

2010–2015 **High School degree**, Liceo Classico G. Mazzini, Genova, Italy, **100/100 cum laude.**

Associations

2021–Now INAF, Osservatorio Astronomico di Brera.

2020–Now Euclid Consortium member.

2019–Now INFN, Genova.

Scientific Activity

My research interests lie in the field of Cosmology, with a particular focus on identifying and characterizing observational systematic effects that may have an impact on the spectroscopic measurements of current galaxy surveys. I aim to understand their impact on galaxy clustering analysis and, ultimately, on the measurements of the fundamental cosmological parameters.

I have actively contributed to the ESA Euclid space mission for over four years. Euclid, a

space telescope of the European Space Agency, is dedicated to studying the Dark components of the Universe through an extensive galaxy survey. I made various contributions to the mission since my master thesis project until today as a postdoctoral fellow at the University of Genova, combining both experimental and theoretical approaches.

My initial focus was on a specific type of periodic in-flight calibration, known as *self-calibration*. In this context, I provided the Euclid Calibration Team with the sequence of pointings in the sky for observing the self-calibration field and meet the mission requirements for this calibration.

My current activity is focused on the scientific analysis of the Euclid spectroscopic data. My goal is to assess the impact of an incorrect redshift determination for a fraction of the observed galaxies on the galaxy clustering analysis. So far I've been focusing on the effect of the presence of such redshift contaminants (namely *interlopers*) on the galaxy two-point correlation function measurements. In this context, I got familiar with the official mock catalogues provided by the Euclid collaboration, and I utilized the official Euclid OU-LE3 code to compute the two-point correlation functions.

The outlook of this analysis, which is my current main scientific task, is the evaluation of the impact of the presence of the interlopers on the fundamental cosmological parameters' measurements. The objective is to understand how systematic errors introduced at the measurement level propagate to the estimates of cosmological parameters. This effect has the potential to introduce significant biases in the cosmological results and to degrade the corresponding uncertainties. I am currently exploring various cosmological models to incorporate the presence of interlopers in the contaminated sample.

Research plan

I intend to leverage the expertise I've gained in developing the Euclid spectroscopic data analysis pipeline over the past five years to continue contributing to the mission's scientific objectives. It's crucial to manage systematic errors effectively, especially during the initial stages of the Euclid survey. Therefore, my plan involves creating a specialized pipeline to pinpoint potential systematic errors in the data analysis or compression into summary statistics and mitigate their influence on the scientific analysis of galaxy clustering.

Scientific responsibilities

- Co-lead of the Galaxy Clustering Key Project on observational systematics for *Euclid* DR1 (*Data Release 1*)
- SOC member of the conference *Optimizing the Extraction of Cosmological Information from the Latest Spectroscopic Redshift Surveys*, July 14-18, 2025, Sexten, Italy.
- LOC member of the workshop *Understanding the Galaxy/Matter Connection in the Era of Large Surveys*, September 16-17, 2025, Sestri Levante, Italy.
- Lead of the *Euclid* Key Project paper: "The impact of redshift errors on the *Euclid* two-point correlation function"
- Lead of the *Euclid* project: "Euclid preparation: The need for photometric flats from dithered self-calibration images"
- Representative of Università degli Studi di Genova and INFN-Genova at the launch of the *Euclid* satellite, Kennedy Space Center, FL (USA), July 1, 2023.

Publications

34 publications, including *Euclid Key Project & Flagship* Publications. In the following, I report a subset of **selected publications** in which I was deeply involved.

Under internal review I. Risso et al, *Euclid preparation. The impact of redshift interlopers on the two-point correlation function analysis*

This paper is going to outline the impact of the interlopers on the Euclid two-point correlation function measurements and on the inference of the fundamental cosmological parameters. It is one of the Euclid Key Project papers on observational systematics.

Currently in preparation I. Risso et al, *Euclid preparation: The need for photometric flats from dithered self-calibration images.*

This paper is going to outline the protocol that I followed to select the optimal pointing sequence that has been chosen by the Euclid Calibration Team for the Euclid self-calibration.

2024 I. Risso, *Counting pairs in Euclid. The self-calibration observation sequence and the impact of the interlopers on the two-point correlation function*, PhD Thesis, <https://hdl.handle.net/11567/1165136>.

2023 F. Passalacqua et al, *Testing the spectroscopic reconstruction for the Euclid experiment*, IL NUOVO CIMENTO C (2023), DOI: 10.1393/ncc/i2023-23122-x.

2022 I. Risso et al 2022 PoS ICHEP2022, 1057, *Selection of the optimal pointing pattern for the Self-Calibration field of the Euclid mission*, doi:10.22323/1.414.1057.

2021 S. Davini, I. Risso et al 2021 PASP 133 084501, *A Proposal for Relative In-flight Flux Self-calibrations for Spectro-photometric Surveys.*

This paper describes the algorithm that I developed to simulate the in-flight relative flux self-calibration of a generic spectro-photometric galaxy survey. The reconstruction of the illumination variation is based on a χ^2 minimization: I improved the method outlined in previous works and I verified that it gave unbiased results. I validated the procedure in a plausible scenario, simulating a simplified sequence of observations with the purpose of quantifying the relative importance of the number of sources and exposures for correctly reconstructing the instrument response.

2021 I. Risso et al, *In-flight flux self-calibration procedure for cosmological surveys*, IL NUOVO CIMENTO 44 C (2021) 99, DOI: 10.1393/ncc/i2021-21099-0.

Tutoring experiences

2023-2024 **Co-supervisor** of a Master degree student:

Gabriele Russo (Title: *Impact of galaxy interlopers on cosmological template fit.*), Università degli Studi di Genova, Department of Physics.

2023-2024 **Co-supervisor** of a Master degree student:

Edoardo Maragliano (Title: *Impact of galaxy interlopers on cosmological reconstruction*), Università degli Studi di Genova, Department of Physics.

- 2023 **Didactic Tutor**, Stages in Physics for high school students , Università degli Studi di Genova, Jan 23 - Feb 2, Genova, Italy. Supervisor: Prof. Tosi.
- 2022 **Didactic Tutor**, Stages in Physics for high school students , Università degli Studi di Genova, February 7-18, Genova, Italy. Supervisor: Prof. Tosi.
- 2022 **Tutor in Physics for university students**, Teaching support activity, Università degli Studi di Genova, Genova, Italy. Supervisors: Prof. Cavalleri and Prof. Canale.

Outreach

- 2024 Invited talk at Osservatorio Astronomico di Genova - Alternanza Scuola-Lavoro (PCTO) for high school students, Università Popolare Sestrese, March 14.
- 2023 Talk for "*Giornata Nazionale dello Spazio*", *Euclid ed il lato oscuro dell'universo*, Università degli Studi di Genova, December 16.
- 2023 Invited talk at Osservatorio Astronomico di Genova, *Euclid and the Dark Side of the Universe*, Università Popolare Sestrese, November 2.
- 2023 Talk at "*Notte Europea dei Ricercatori*", *Eplorando l'universo oscuro*, INFN-GE & Università degli Studi di Genova, September 29.
- 2023 Contribution to the start of the outreach activities organized by the Italian Euclid Consortium team.
- 2022 Support to the LOC at "International Conference PUMA22 Probing the Universe with Multi-messenger Astrophysics", September 26-30, Sestri Levante, Italy.
- 2022 Talk about telescopes on satellite for *Univesità della terza età*, May 23, Genova.
- 2021 Talk for "*Giornata Nazionale dello Spazio*", INFN-Genova YouTube channel https://www.youtube.com/watch?v=ZboYpx_r1GQ&ab_channel=INFNGenovaDivulgazione, December 16.
- 2019 *Man on the Moon* festival, July, Univesità degli studi di Genova, Italy. Member of the Local Organizing Committee and poster session.
- 2018 Master class on Particle Physics, Department of Physics, Genova, Italy. I assisted my Professor in introducing high-school students into the world of high energy physics through an online simulation software developed at CERN.

Presentations at conferences

- 2022 **ICHEP**, *The pointing strategy for the Self-Calibration of the Euclid mission*, International Conference of High Energy Physics, July 8, Bologna, Italy. Poster.
- 2021 **ATLAS21**, *A procedure for relative in-flight flux self-calibrations of spectrophotometric instruments for cosmological surveys*, Massively parallel spectroscopy from space. An ATLAS Probe community workshop, June 21-25 (remotely). Digital poster.
- 2021 **XIX International Workshop on Neutrino Telescopes**, *Preliminary study on the relative in-flight flux self-calibration for the Euclid NISP instrument*, February 18-26 (remotely). Flash Talk.
- 2020 **106th National Congress of Società Italiana di Fisica**, *Calibrazione in flusso per lo spettrografo a infrarossi dell'esperimento Euclid*, September 2020 (remotely). Talk (field: Astrophysics).

Presentations at collaboration meetings

- 2025 **Euclid GC Meeting**, *Angular systematics: star mask*, January 20 - 24, MPE in Garching, Germany.
- 2024 **Euclid GC Meeting**, *Impact of interlopers on the Euclid two-point correlation function.*, January 29 - February 2, Marseille, France.

- 2023 **Euclid Consortium Meeting**, *Modeling noise and line interlopers and their impact on clustering measurements*, June 19-23, Copenhagen, Denmark.
- 2023 **Euclid GC Meeting**, *Interlopers and how to tame them*, February 20-24, Milano, Italy.
- 2023 **6th Italian Euclid Collaboration Meeting**, *Interlopers*, January 19-20, Roma, Italy.

Honors & Awards

- 2021 Awarded as one of the three **Best Flash Talks** at XIX International Workshop on Neutrino Telescopes, February 2021.
- 2020 Awarded among the **Best Communications** for the Astrophysics section at the 106th National Congress of SIF, Italy.
- 2013 2nd winner of the contest "Crescere in compagnia", field: fiction. Genova, Italy.
- 2013 Winner of the *Certamen* contest of translation from Latin to Italian organized by my High School, Genova, Italy.

Computer skills

- **Programming languages**
Python, C++, MATLAB.
 - **OS**
Windows, Linux and macOS
 - **Editing**
Latex; Google/Microsoft/Apple packages.
 - **Cloud**
Git; Google/Microsoft/Apple clouds.
 - **Analysis and simulation**
Root, Scidavis, fv FITS Viewer, HDFView, TOPCAT.
- 2021 MATLAB Fundamentals, MathWorks (November 9, 2021).
- 2021 MATLAB Onramp, MathWorks (September 30, 2021).

Languages

- **Italian:** mother tongue
- **English:** B2, very good knowledge of written and spoken language
First Certificate in English (FCE)
- **French:** basic

Schools

- 2022 Advanced Euclid School - "The science of future cosmological surveys", June 20 - July 1, Les Houches, France.
- 2021 "ISAPP School on Neutrino Physics, Astrophysics and Cosmology", July 21-30, Valencia (virtual meeting).

2020 Advanced Euclid School - "The science of future cosmological surveys", June, (virtual meeting).

Certificates

- 2021 MATLAB Fundamentals, MathWorks (November 9, 2021).
- 2021 MATLAB Onramp, MathWorks (September 30, 2021).
- 2020 Special training course for a low-risk office work, Università degli Studi di Genova (February 18, 2020).
- 2020 Cibersecurity course - BASE, INFN, (November 3, 2020).
- 2019-2020 Acquisition of 24 CFU for teaching, Università degli Studi di Genova.
- 2014 First Certificate in English, Cambridge English Language Assessment (July 7, 2014).

References

- **Ben Granett**

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