



# Giulia Campailla



## ● EDUCATION AND TRAINING

01/09/2023 – CURRENT Genova, Italy

**DOCTOR OF PHILOSOPHY (PHD)** Università degli Studi di Genova, Dipartimento di Fisica

Currently I am focusing on the development of machine learning algorithms for optimizing the data analysis within the collaboration Dark Energy Survey (DES). My supervisor is Professor Marco Raveri (UniGe).

**Field of study** Machine Learning applied to Cosmology

**Link** <https://www.darkenergysurvey.org/>

09/2021 – 09/2023 Genova, Italy

**MASTER DEGREE** Università degli Studi di Genova, Dipartimento di Fisica (DIFI)

Abstract:

In recent years, a growing difference has been observed in the determination of the Hubble constant. This is known as the Hubble constant tension and stems from a discrepancy between the Hubble constant's values estimated using high-redshift and low-redshift probes, casting a shadow over the standard cosmological model's description of our Universe.

Pivotal cosmological measurements, such as those from the 2018 Planck collaboration, indicate that the values derived from Cosmic Microwave Background (CMB) anisotropy observations are notably lower than those estimated using the distance ladder method, which relies on Cepheid variables or SNIa as standard candles.

If this mismatch is not a byproduct of systematic errors, the most compelling resolution to the Hubble constant tension might necessitate expanding or even supplanting our current standard cosmological framework.

While no model seamlessly bridges this gap in observations, introducing a new Dark Radiation sector offers a promising approach. This framework encapsulates light relativistic particles that do not have electromagnetic or strong interactions with other constituents but may have been relevant during the universe's early stages.

Against this backdrop of this tension, my thesis undertakes the task of developing a phenomenological framework that describes a generalized Dark Radiation model. Central to this endeavor is the understanding of the phase space distribution of these light species, aiming to shed light on their cosmic imprints beyond traditional approaches.

A central feature of this generalized Dark Radiation paradigm is the integration of non-standard anisotropic stress higher-order moments in the Boltzmann equations hierarchy.

These are expected to leave unique imprints on the CMB and the distribution of large-scale structures that can be used to discriminate between different models in future studies.

**Field of study** Theoretical Physics, Astrophysics and Cosmology | **Final grade** 110/110 cum laude |

**Thesis** Towards a Generalized Dark Radiation model

2018 – 2021 Genova, Italy

**BACHELOR DEGREE** Università degli Studi di Genova, Dipartimento di Fisica (DIFI)

**Field of study** Physics | **Thesis** Thermodynamics of off-equilibrium systems

2013 – 2018 Chiavari, Italy

**SCIENTIFIC HIGH-SCHOOL DIPLOMA** Liceo scientifico Marconi-Delpino

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**Final grade** 100/100 cum laude

## ● WORK EXPERIENCE

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10/2022 – 11/2022 Genova, Italy

**SCIENCE POPULARIZER** FESTIVAL DELLA SCIENZA DI GENOVA

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I worked as science popularizer for 'Festival della Scienza 2022', which took place in Genoa from 20 October to 1 November 2022. 'The Wonders of Science' was the interactive scientific exhibition I took part in with the aim of bringing visitors of all ages closer to the world of science and technology, through a hands-on approach. My team and I organized the entertaining and explaining activities regarding math and classical physics topics.

**Website** [www.festivalscienza.it](http://www.festivalscienza.it)

2017 – CURRENT

**TUTOR**

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I weekly provide private lessons about both scientific and humanistic subjects to students from elementary, middle and high school.

2017 – 2018 Lavagna, Italy

**SWIMMING TEACHER** ASD LAVAGNA90

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During my "Alternanza Scuola Lavoro" (PCTO) programme I worked as swimming teacher at the sports club "ASD Lavagna90" two days per week after school.

## ● LANGUAGE SKILLS

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Mother tongue(s): **ITALIAN**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
<b>ENGLISH</b>	C1	C1	C1	C1	C1

*Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user*

## ● DIGITAL SKILLS

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**Softwares data and numerical analysis**

CAMB | ROOT | Mathematica | LaTeX

**Programming languages**

Matlab | python | C++

## ● ADDITIONAL INFORMATION

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### CONFERENCES AND SEMINARS

26/09/2022 – 01/10/2022 – Sestri Levante

**International conference PUMA22 Probing the Universe with Multimessenger Astrophysics** The conference was jointly organized by INFN-Sezione di Genova and Dipartimento di Fisica-Università di Genova. The conference aim was providing an overview of the status and future prospects of astrophysics and cosmology with a multi-messenger approach. The sessions dealt with astrophysics with electromagnetic waves, astrophysics with gravitational waves, astroparticle physics and neutrino astrophysics, nuclear astrophysics, cosmology.

2022 – 2023 – Università degli Studi di Genova

### **Journal Club - Cosmology Group**

2022 – 2024 – Genova, Milano, Torino

**Cosmology Meeting - Genova Milano Torino (GeMiTo)** A series of meetings organized by various research groups in Astrophysics and Cosmology from the departments of Genoa, Milan, and Turin, aimed at fostering collaborations and keeping group members updated on ongoing research projects in this field. Among the participating members in the project, in addition to my current supervisors, Professors Enzo Franco Branchini and Marco Raveri, are Professors Luigi Guzzo, Stefano Camera, Emanuele Castorina, and Maria Archidiacono. The first meeting was held in Milan on June 5th, 2023, in which I actively participated by presenting my current thesis work. The next meeting will take place in Turin in the autumn, followed by Genoa next year.

### **HOBBIES AND INTERESTS**

**Sports** I have been practicing swimming for twenty years in the professional team of "ASD Lavagna 90". I used to practice at a competitive level, with a program of six trainings per week. In the last five years I started going running and since then I joined several half-marathon competitions.

### **Travels and Experiences Abroad**

1. During my academic journey, while attending the Master Course in Theoretical Physics, I had the opportunity to visit several meaningful places from a Physics' student's point of view. In thi last year, I have spent a week at CERN laboratories in Ginevra with Professors Roberta Cardinale, Fabrizio Parodi and Alessandro Petrolini (UniGe); I have been to "Osservatorio Astronomico del Parco dell'Antola" nearby Genoa under the guidance of Professor Silvano Tosi (UniGe). I also visited the Solar Observatory "A. Riccò" (Catania, via S. Sofia, 78) and "M.G. Fracastoro" (Contrada Serra la Nave, Mt. Etna, 1725 m s.l.m.) in 2020.
2. In the summer of 2016, I spent nearly a month in Oxford hosted by two retired professors. This personal initiative let me improve my English skills as well as gain independence and adaptability skills.

### **LANGUAGE CERTIFICATES**

2023 – CURRENT

#### **IELTS, British Council**

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Expected Valuation: 8/9 (Level: C1-C2)

2016

#### **B2 First, Cambridge English Certification**

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Valuation: 188/190 (Level: C1)

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