

# Toni Bertólez-Martínez

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## Education & Experience

### PhD in Physics

UNIVERSITAT DE BARCELONA

Barcelona, Spain

2021 - Summer 2025

- Advisor: Dr. Jordi Salvadó Serra
- PhD thesis: “Massive neutrinos as a window to New Physics in Particle Physics, Astrophysics and Cosmology”.
- FPI fellowship for PhD studies from Ministerio de Ciencia y Universidades.

### MSc Astrophysics, Particle Physics and Cosmology

INSTITUT DE CIÈNCIES DEL COSMOS, UNIVERSITAT DE BARCELONA

Barcelona, Spain

2019 - 2020

- Specialization in Particle Physics and Gravitation. Average grade 9.4/10.
- Master’s thesis: “Dark matter from inflaton - Higgs coupling”, supervised by Dr. Alessio Notari.
- Graduate researcher fellowship for MSc thesis from ICCUB.

### BSc Undergraduate Degree in Physics

UNIVERSITAT DE BARCELONA

Barcelona, Spain

2015 - 2019

- Specialization in Fundamental Physics. Average grade 8.7/10.
- Bachelor’s thesis: “Coleman-Weinberg Symmetry Breaking and Higgs Physics”, supervised by Dr. Federico Mescia.
- Undergraduate researcher fellowship for BSc thesis from the Spanish Ministry of Education.
- Undergraduate research assistant fellowship for Summer School at Deutsches-Elektronen-Synchrotron (DESY).

## Publications

### PUBLISHED

#### High Frequency Gravitational Wave Bounds from Galactic Neutron Stars.

Virgile Dandoy, **Toni Bertólez-Martínez**, Francesco Costa.

*Submitted for publication at JCAP.* Available at arXiv [2402.14092](#).

#### IceCube and the origin of ANITA-IV events.

**T. Bertólez-Martínez**, C. A. Argüelles, I. Esteban, J. López-Pavón, I. Martínez-Soler, J. Salvadó.

*JHEP 07 (2023), 005.* Available at arXiv [2305.03746](#).

#### Impact of wave packet separation in low-energy sterile neutrino searches.

C. A. Argüelles, **T. Bertólez-Martínez**, Jordi Salvadó.

*Phys.Rev.D 107 (2023) 3, 036004.* Available at arXiv [2201.05108](#).

### CONTRIBUTED

M. A. Acero et al. White Paper on Light Sterile Neutrino Searches and Related Phenomenology. [2203.07323](#).

## Secondments

Mar 2024 **Fermi National Acceleratory Laboratory (FNAL)**, Batavia, USA. Two months stay working on ultra-high-energy neutrinos with Dr. Pedro Machado.

July 2023 **Fermi National Acceleratory Laboratory (FNAL)**, Batavia, USA. One month stay working on neutrino cosmology with Dr. Olga Mena and Rasmi Hajjar.

# Presentations

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## SEMINARS

- Oct 2024 **Going beyond cosmological bounds on neutrino masses.**  
Invited seminar: CERN, Switzerland.
- Apr 2024 **What do we measure when we measure the neutrino mass in cosmology?**  
Invited chalk talk: Fermilab, USA.
- Apr 2024 **What do we measure when we measure the neutrino mass in cosmology?**  
Invited seminar: Laboratory for Particle Physics and Cosmology (LPPC), UHarvard, USA.
- Mar 2024 **IceCube and the origin of the ANITA-IV events.**  
Invited seminar: Centre For Neutrino Physics (CNP), VirginiaTech.
- Oct 2023 **IceCube and the origin of the ANITA-IV events.**  
Invited seminar: Instituto de Física Corpuscular (IFIC), UV.
- Jul 2023 **IceCube and the origin of the ANITA-IV events.**  
Invited seminar: Laboratory for Particle Physics and Cosmology (LPPC), UHarvard, USA.
- May 2023 **IceCube and the origin of the ANITA-IV events.**  
Invited seminar: Center for Cosmology and AstroParticle Physics (CCAPP), Ohio, USA.

## INVITED TALKS

- Sep 2024 **Going beyond cosmological bounds on neutrino masses.**  
Invited talk: EuCAPT Astroneutrino Workshop 2024, Prague.
- Jul 2024 **Going beyond cosmological bounds on neutrino masses.**  
Invited talk: Invisibles24 Workshop, Bologna.
- Aug 2023 **IceCube and the origin of the ANITA-IV events.**  
Invited talk: Invisibles23 Workshop, Göttingen.
- May 2023 **The origin of the ANITA-IV events from the synergies with IceCube.**  
Invited talk: Third Annual EuCAPT symposium 2023, CERN, Switzerland.  
Received an EuCAPT lightning talk prize in recognition of this talk.
- Jul 2022 **Impact of Wave Packet Separation in Low-Energy Sterile Neutrino Searches.**  
Invited talk: Here, There and Everywhere Neutrino School 2022, NBIA, Denmark.
- Jun 2022 **Impact of Wave Packet Separation in Low-Energy Sterile Neutrino Searches.**  
Invited talk: Invisibles22 Workshop, Paris-Saclay University (IJCLab), Orsay, France.
- Feb 2022 **Ghostbusters! A perspective on neutrino oscillations.**  
Invited talk: ICCUB Winter Meeting 2022, Barcelona, Spain.

## POSTERS

- Jul 2024 **Going beyond cosmological bounds on neutrino masses.**  
UBarcelona - Downing College MCR, UCambridge Early Career Researchers' Day.
- Jul 2024 **Going beyond cosmological bounds on neutrino masses.**  
Invisibles24 Workshop, Bologna. Received the best poster of the session award.
- Aug 2023 **What is the origin of the ANITA-IV events?**  
Invisibles23 School & Workshop, Germany. Prize for the 3rd best poster of the session.
- Aug 2023 **What is the origin of the ANITA-IV events?**  
Third Annual EuCAPT symposium 2023, CERN.
- Jun 2022 **Impact of Wave Packet Separation in Low-Energy Sterile Neutrino Searches**  
Invisibles22 School & Workshop, Paris-Saclay University (IJCLab), Orsay, France.  
Received the prize for the best poster of the session.

## Attended conferences

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- 2024 **EuCAPT Astroneutrino Theory Workshop**, Prague, Czech Republic  
**Invisibles24 Workshop**, Università di Bologna, Italy
- 2023 **Invisibles23 School & Workshop**, Universität Heidelberg and Georg-August-UGöttingen  
**International Neutrino Summer School**, Fermilab  
**Physics and Gender School**, Universitat de Barcelona  
**Third Annual EuCAPT Symposium**, CERN, Geneva, Switzerland
- 2022 **Invisibles22 School & Workshop**, Paris-Saclay University (IJCLAB), Paris, France  
**Here, There & Everywhere Neutrino School 2022**, Niels Bohr Institute, Denmark
- 2021 **Invisibles21 School**, Online

## Teaching Experience

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- 2022-2023 **Mètodes Matemàtics per a la Física I**, Teaching Assistant, 15h *UB*
- 2021-2022 **Mètodes Matemàtica per a la Física II**, Teaching Assistant, 15h *UB*

## Community service

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### COMMISSIONS

- 2024 - **EuCAPT Outreach Task Force**, junior contributor. *EuCAPT*
- 2024 - **PhD Students representative**, at the ICCUB Council. *ICCUB*
- 2022-2023 **PhD Meeting commission**, Co-organizer of the weekly meetings between PhDs, where we build a support network and train ourselves. *ICCUB*
- 2022-2025 **Encontres amb el Tercer Cicle (E3C)**, Member of E3C, an association that organizes outreach talks from PhD students to undergrads. *UB*
- 2021-2024 **Diversity, Equity and Inclusion Commission (DEIC)**, PhD students representative *ICCUB*
- 2021 - **Equality Commission of the Physics Department**, PhD students representative *UB*

### MENTORING

- 2021-2024 **MS Astrophysics, Particle Physics and Cosmology**, Co-organizer and mentor of a program to guide MSc students in the first steps of their academic career. *ICCUB*

### ORGANIZING COMMITTEE FOR CONFERENCES

- Oct 2024 **II Cross-Collserola PhD Meeting in Astrophysics, Cosmology and Particles**, SOC *ICE (CSIC)*
- Oct 2023 **Cross-Collserola PhD Meeting in Astrophysics, Cosmology and Particles**, LOC *ICCUB*

## Outreach

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### OUTREACH ON THE SOCIAL NETWORKS

**Del buit al tot** is a personal project of scientific outreach in Physics addressed to the youth and in Catalan. Between YouTube, Twitter, Instagram and TikTok, it gathers around 9.000 followers.

**Neurones Fregides** is a platform of scientific outreach in Catalan, which I have co-founded. It assembles different outreach projects centered in social media. Between YouTube, Twitter, Instagram and Twitch, it gathers almost 30.000 followers.

- 2024 **“Ajuts Joan Oró per a projectes divulgatius 2023”**, Won a grant for carrying the outreach project “La Hipòtesi Absurda”, a podcast on science, society and culture.
- 2022 **“Ajuts Joan Oró per a projectes divulgatius 2021”**, Won a grant for carrying the outreach project “Disseccionem la ciència” within the platform “Neurones Fregides”.
- “Premios de divulgación científica CPAN”**, Won a prize for an outreach video about the IceCube telescope and neutrino astronomy.
- 2021 **“Premis de divulgació ACCC”**, Won a prize on outreach for my project “Del buit al tot”.

## PRESS AND MEDIA

- 2024 **Scientific writer for “Núvol”**, Núvol is a Catalan digital newspaper for which I will be occasionally writing some articles on different scientific topics.
- “Cau la nit al Castell de Pladurs” podcast**, Two podcast episodes on cosmic rays and neutrino astronomy.
- 2023 **La Tarda de Catalunya Ràdio**, Radio section on scientific outreach and the book “Per què els elefants no tenen càncer?”
- Radio Nacional Espanyola, El Pla B**, Radio section on science interdisciplinarity and the book “Per què els elefants no tenen càncer?”
- Radio OndaCero Catalunya**, Radio section on science interdisciplinarity and the book “Per què els elefants no tenen càncer?”
- Per què els elefants no tenen càncer?**, Co-published a book on general scientific questions from an interdisciplinary point of view. Wrote a chapter on complex systems and the Ising model.
- Radio OndaCero Catalunya**, Radio section on astronomy, JWST and Euclid
- Quan vinguin els marciàns (TV3)**, 1 television interview on scientific culture and outreach
- Totes les cares de l’astrologia (Diari de Barcelona)**, Interview for a news report on astrology, where I debunked its unscientific claims.
- Ràdio Olot - La Butaca d’Einstein**, 6 radio sections on Quantum Physics
- 2022 **Ràdio Estel**, Radio section on Quantum Teleportation
- Radio OndaCero Barcelona**, Radio section on Einstein, Bohr and Quantum Entanglement
- “Explica’m, tresor” podcast**, Podcast episode on research and scientific outreach

## TALKS AND WORKSHOPS

- 2024 **Una astronomia poc convencional: física de partícules per a entendre l’Univers, i viceversa.**, Outreach talk at ASTER, the astronomical association of Barcelona.
- Una astronomia poc convencional: física de partícules per a entendre l’Univers, i viceversa.**, Outreach talk at Can Ginestar, Sant Just Desvern.
- Cafè Conti de l’Ateneu Barcelonès**, Invited as a speaker for a youth gathering around the vices of academia.
- Som el futur: els i les joves parlem de la ciència**, Organized and moderated a round table on the role of youth on science and its impact on society.
- 2023 **“Els LEGO de la matèria: més enllà de protons, neutrons i electrons.”**, Teacher of a 20h Introduction to Particle Physics course, aimed to people with no knowledge on Physics.
- “L’Univers és ple de colors: l’astrofísica a través de múltiples mirades”**, Co-organizer of a round table on multimessenger astronomy, together with some ICCUB colleagues.
- Tesimarató Física UB 2023**, Physics UB winner in a contest to disseminate the thesis in 4’.
- Victoriano Pineda prize for PhD research and outreach**, Obtained this prize in recognition of the best outreach short talk during the UB PhD Day.
- Premis InnoBages 2023**, Round table on scientific outreach at Manresa, Bages.
- 3/4-Minute-Thesis**, UB finalist in two contests to disseminate the thesis in 3 or 4 minutes.

**“Un Univers en expansió”, Jornades del Cosmos**, Talk about cosmology to a general public. Furthermore, I helped organize the outreach weekend event.

**“Biennal Ciutat i Ciència: Joves fent camí per la ciència”**, Round table with young researchers about the challenges and opportunities in Science for the youth.

**“Taula rodona sobre cosmologia i el paper de la dona a la ciència”**, ICCUB, Round table on cosmology and the role of women in STEM.

2022 **“Veure allò que és invisible: observem la matèria fosca”**, InSpiracy 2022, Talk about dark matter to high-schools.

**“Veure allò que és invisible: observem la matèria fosca”**, Sopa de partícules, Talk about dark matter to a general public.

**“Com de grans som a l’Univers?”**, Cal Forner Castellcir, Talk about cosmic scales to a general public.

**Pèntagon UPF 2022**, Round table on different outreach projects, I talked about Neurons Fregides.