Mattia Atzori Corona

Email: mattia.atzori.corona@ca.infn.it
ma.atzoricorona@gmail.com
Publication Link: INSPIRE-HEP

Education

PostDoc in Physics — Rome –Italy
INFN - Tor Vergata — December 2024 - Current
Project title "Study of Coherent Elastic Neutrino-Nucleus Scattering with the NUCLEUS Experiment"

Ph.D. in Physics — Cagliari (CA)–Italy
University of Cagliari, Advisor: Matteo Cadeddu — October 2021–Current
Discussion Session: January 2025
Main Scientific Disciplinary Sector: FIS/02
Secondary Scientific Disciplinary Sector: FIS/01
PhD Thesis Title: **Phenomenology of Neutrino Interactions for Coherent Neutrino-Nucleus Scattering and Dark Matter Experiments**

Visiting PhD, Technical University of Munich (TUM)
Research for the NUCLEUS Experiment — October 2023–April 2024

Master degree in Physics — Cagliari (CA)–Italy
University of Cagliari, 110 cum laude, 28/07/2021 — 2019–2021

- Thesis: "Cosmological constraints on light self-interacting sterile neutrinos and implications for cosmic concordance" (Advisor: Matteo Cadeddu, Co-Advisor: Riccardo Murgia)

Bachelor degree in Physics — Cagliari (CA)–Italy
University of Cagliari , 110 cum laude, 20/09/2019 — 2016–2019

- Thesis: "Simulazione dell'interazione della materia oscura con il Sole per rilevare WIMP di bassa massa" (Advisor: Matteo Cadeddu, Co-Advisor: Marcello Lissia)

High School Diploma — Carbonia (SU)–Italy
Liceo Scientifico Gramsci Amaldi, 96/100 — 2011–2016

Awards

- Winner of the award "Best Master's Graduate Student of the Faculty of Science in the University of Cagliari AA 2020/2021"
- **Excellence Program** for the Master Degree in Physics — 2019–2021
- Winner of the award "Prize for the best students enrolled in the master's degree at the University of Cagliari AA 2019/2020"
- **Excellence Program** for the Bachelor Degree in Physics — 2016–2019

Research Experience in International Collaborations

Part of the DarkSide-20k Collaboration — 2021-Current

Part of the NUCLEUS Collaboration — 2024-Current

Talks and Poster at Workshops, Conferences and Schools

- **EPIC 2024**, Geremeas, 23-27/09/2024
  - Flash talk and Poster: Low-Energy Global Analysis for Electroweak and Nuclear Physics
  - Best Poster Award
- **NOW 2024**, Otranto, 2-8/09/2024
  - Talk: The Dark Matter Search with DarkSide-20k The solar neutrino and argon-39 backgrounds
- **Invisibles24**, Bologna, 1-5/07/2024
  - Young scientists talk and Poster: Shedding light on the neutrino charge radius with CEνNS data
- **Magnificent CEνNS Workshop (VI edition)**, Valencia, 12-14/06/2024
  - Talk: Exploring the Migdal Effect in CEνNS searches at low energies
- **Neutrinos From Home**, Online, 23/04/2024-01/05/2024
  - Pre-recorded talk and online discussion: Exploring electroweak physics through low-energy neutrino scattering data
- **MEDEX Conference**, Invited Speaker, Prague, 4-8/09/2023
  - Talk: Probing nuclear and electroweak physics with coherent elastic neutrino nucleus scattering
- **SNvD 2023@LNGS: International Conference on Supernova Neutrino Detection**, LNGS, 29-01/06/2022
  - Poster: Unraveling neutrino electromagnetic properties using the LUX-ZEPLIN dark matter experiment results
- **Magnificent CEνNS Workshop (V edition)**, Munich, 22-27/03/2023
  - Talk: Updated constraints on light mediators from CEνNS data
- **SoUP 2022: The 2nd INFN school on underground physics**, LNGS, 20-24/06/2022
  - Poster: *Pseudoscalar sterile neutrino self-interactions in light of Planck, SPT and ACT data*
- **Neutrino 2022**, online, 30-04/06/2022
  - Pre-recorded talk and poster: *Pseudoscalar sterile neutrino self-interactions in light of Planck, SPT and ACT data*

Invited Scientific Seminars

Talk at the Techincal University of Munich - e15 Seminar 08/04/2024
The Hitchhiker's Guide to CEνNS: The neutrino toolkit to probe the unknown

Talk at the "Liceo Scientifico Gramisci Amaldi" (Carbonia) 27/04/2023
Studiare Fisica all'Università di Cagliari

Participation at International Events

- Excess Workshop, Rome, 6/07/2024
- Neutrino–Nucleus Interactions in the Standard Model and Beyond, online, 17–21/01/2022
- Magnificent CEνNS workshop (IV edition), online, 6-7/10/2021
- Recent Advances in the Physics of BBN and Neutrino Decoupling, online, 12-13/04/2021
- Magnificent CEνNS workshop (III edition), online, 16-20/11/2020

Participation at Schools

- **School on Electroweak Physics**, Geremeas, 22/09/2024
- **Magnificent CEνNS/Mona School**, Munich, 27/03/2023–29/03/2023
- **SoUP 2022: The 2nd INFN school on underground physics**, LNGS, 20/06/2022–24/06/2022
- **SIGRAV School on Cosmology**, online, 14/02/2022–18/02/2022
- **Scuola Estiva al Sardinia Radio Telescope**, Selargius and San Basilio (CA), 30/09/2015–05/10/2015
  - Scuola per Studenti di Liceo

Teaching

- **Teaching Assistant** at the University of Cagliari 2022-2023
  Fundamentals of Theoretical Physics (Special Relativity and Quantum Mechanics)
- **Teaching Assistant** at the University of Cagliari 2022
  General Physics I (Mechanics and Thermodynamics)

Co-supervision of Degree Theses

Co-supervisor for Master student Riccardo Pavarani Cagliari (CA)–Italy
University of Cagliari, 110 cum laude, 27/02/2024
Supervisor: Prof. Matteo Cadeddu; Co-supervisor: Dr. Mattia Atzori Corona

- Thesis: "Misura delle proprietà nucleari ed elettrodeboli e analisi di sensibilità attraverso la diffusione elastica e coerente dei neutrini sull'argon con l'esperimento COHERENT"

Co-supervisor for Bachelor student Elisa Pinna Cagliari (CA)–Italy
University of Cagliari, 23/11/2023
Supervisor: Prof. Matteo Cadeddu; Co-supervisor: Dr. Mattia Atzori Corona

- Thesis: "Neutrini da supernova e loro rivelazione tramite il processo di diffusione elastica e coerente con la materia"

Co-supervisor for Master student Marco Cacace Cagliari (CA)–Italy
University of Cagliari, 110 cum laude, 30/03/2023
Supervisor: Prof. Matteo Cadeddu; Co-supervisor: Dr. Mattia Atzori Corona

- Thesis: "Simulazione della diffusione di particelle di materia oscura con gli elettroni del Sole e della loro interazione con i rivelatori ad argon"

Co-supervisor for Master student Gianbattista Masia Cagliari (CA)–Italy
University of Cagliari , 110 cum laude, 28/07/2022
Supervisor: Prof. Matteo Cadeddu; Co-supervisor: Dr. Mattia Atzori Corona; Dr. Nicola Cargioli

- Thesis: "Misurare le proprietà nucleari ed elettrodeboli attraverso la diffusione elastica e coerente dei neutrini sui nuclei tramite i dati dell'esperimento COHERENT"

Organization Experience

Representative of PhD students 2021-2024
University of Cagliari, Physics Department

DarkSide Young Academy 2024, Co-Founder and Co-Organizer Napoli, 21-23/02/2024
First edition of an Academy addressed to young scientists of the DarkSide Collaboration.

XIII Einstein Telescope Symposium Cagliari, 8-12/05/2023
Staff

Skills

- **Mathematica:** Excellent
- **Python:** Good
- **C++:** Basic
- **C:** Basic

Languages

- **Italian:** Mother tongue
- **English:** C1

Outreach

- **Member of IDeAS (Incontri di Divulgazione e Astrofisica in Sardegna)** 2022- Current
  I cover a management role inside the association. We organize several cultural events, mainly in Sardinia, with the aim of bringing science into small realities.
- Member of the **ASIMOV prize** scientific committee 2022

- **Pint of Science Cagliari** - Staff
  I was part of the staff in 2022, 2023 and 2024.
- **Aria Masterclass - Lecture on Dark Matter and DarkSide-20k**
  Sardegna, Italy
  - Liceo Pacinotti - Cagliari e Salargius (CA), 26/09/2023
  - Liceo Pitagora - Cagliari e Salargius (CA), 27/09/2023
  - Liceo San Gavino - San Gavino Monreale (SU), 30/04/2024
- **Gravitas Cagliari 2022** September 2022
  Staff and Speaker
- **Researcher Night 2019** 27/09/2019
  Staff

Publications

[1] **M.. Atzori Corona**, M. Cadeddu, N. Cargioli, F. Dordei, and C. Giunti. Refined determination of the weak mixing angle at low energy. *Phys. Rev. D*, 110(3):033005, 2024. arXiv:2405.09416, doi:10.1103/PhysRevD.110.033005.

[2] **M. Atzori Corona**, M. Cadeddu, N. Cargioli, F. Dordei, and C. Giunti. Momentum dependent flavor radiative corrections to the coherent elastic neutrino-nucleus scattering for the neutrino charge-radius determination. *JHEP*, 05:271, 2024. arXiv:2402.16709, doi:10.1007/JHEP05(2024)271.

[3] **M. Atzori Corona**, M. Cadeddu, Cargioli N., F. Dordei, and C. Giunti. On the impact of the Migdal effect in reactor CEνNS experiments. *Phys. Lett. B*, 852:138627, 2024. arXiv:2307.12911, doi:10.1016/j.physletb.2024.138627.

[4] **M. Atzori Corona**, M. Cadeddu, Cargioli, F. Dordei, C. Giunti, and G. Masia. *"Nuclear neutron radius and weak mixing angle measurements from latest COHERENT CsI and atomic parity violation Cs data". Eur. Phys. J. C*, 83(7):683, 2023. arXiv:2303.09360, doi:10.1140/epjc/s10052-023-11849-5.

[5] **M. Atzori Corona**, W. M. Bonivento, M. Cadeddu, N. Cargioli, and F. Dordei. *"New constraint on neutrino magnetic moment and neutrino millicharge from LUX-ZEPLIN dark matter search results". Phys. Rev. D*, 107(5):053001, 2023. arXiv:2207.05036, doi:10.1103/PhysRevD.107.053001.

[6] **M. Atzori Corona**, M. Cadeddu, Cargioli, F. Dordei, C. Giunti, Y. F. Li, C. A. Ternes, and Y. Y. Zhang. *"Impact of the Dresden-II and COHERENT neutrino scattering data on neutrino electromagnetic properties and electroweak physics"*. *JHEP*, 09:164, 2022. arXiv:2205.09484, doi:10.1007/JHEP09(2022)164.

[7] **M. Atzori Corona**, M. Cadeddu, Cargioli, F. Dordei, C. Giunti, Y. F. Li, E. Picciau, C. A. Ternes, and Y. Y. Zhang. *"Probing light mediators and (g − 2) through detection of coherent elastic neutrino nucleus scattering at COHERENT"*. *JHEP*, 05:109, 2022. arXiv:2202.11002, doi:10.1007/JHEP05(2022)109.

[8] **M. Atzori Corona**, M. Cadeddu, N. Cargioli, P. Finelli, and M. Vorabbi. *"Incorporating the weak mixing angle dependence to reconcile the neutron skin measurement on Pb208 by PREX-II"*. *Phys. Rev. C*, 105(5):055503, 2022. arXiv:2112.09717, doi:10.1103/PhysRevC.105.055503.

[9] **M. Atzori Corona**, R. Murgia, M. Cadeddu, M. Archidiacono, S. Gariazzo, C. Giunti, and S. Hannestad. Pseudoscalar sterile neutrino self-interactions in light of Planck, SPT and ACT data. *JCAP*, 06(06):010, 2022. arXiv:2112.00037, doi:10.1088/1475-7516/2022/06/010.

DarkSide-20k Publications

[1] F. Acerbi et al. DarkSide-20k sensitivity to light dark matter particles. *Commun. Phys.*, 7(1):422, 2024. arXiv:2407.05813, doi:10.1038/s42005-024-01896-z.

[2] P. Agnes and others (**DarkSide-20k Collaboration**). *"Constraints on directionality effect of nuclear recoils in a liquid argon time projection chamber"*. *Eur. Phys. J. C*, 84(1):24, 2024. arXiv:2307.15454, doi:10.1140/epjc/s10052-023-12312-1.

[3] A. Elersich and others (**DarkSide-20k Collaboration**). *"Study of cosmogenic activation above ground for the DarkSide-20k experiment. arXiv:2301.12970.*

*[4] E. Aaron and others (**DarkSide-20k Collaboration**). 'measurement of isotopic separation of argon with the prototype of the cryogenic distillation plant aria for dark matter searches'.* Eur. Phys. J. C*, 83(5):453, 2023. arXiv:2301.09639, doi:10.1140/epjc/s10052-023-11430-0.*

*[5] P. Agnes and others (**Global Argon Dark Matter Collaboration**). 'sensitivity projections for a dual-phase argon tpc optimized for light dark matter searches through the ionization channel'.* Phys. Rev. D*, 107(11):112006, 2023. arXiv:2209.01177, doi:10.1103/PhysRevD.107.112006.*

Autorizzo il trattamento, la comunicazione dei miei dati personali e degli eventuali dati sensibili ai sensi del D. Lgs. 196/2003.
Autorizzo inoltre la pubblicazione del CV secondo i termini di legge.