Miguel Reis Orcinha — Physicist

CONTACT INFORMATION

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CIENCIAVITAE E51C-249E-6C2E

CURRENT POSITION

Researcher at **Università degli Studi di Perugia — UniPG** &
Istituto Nazionale di Fisica Nucleare — INFN, Perugia, Italy.

EDUCATION

Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal

Ph.D. in **Physics** **Feb 2023**

Thesis title: *Study of solar modulation effects on cosmic ray fluxes measured by the AMS experiment*
Supervisor: Fernando José de Carvalho Barão
Classification: Pass with Distinction
DOI: doi: 10.17181/63p2h-yx741

M.Sc. in **Engineering Physics** **Nov 2014**

Specialization: Physics
Thesis title: *Solar modulation studies and proton-electron separation with the AMS/RICH detector*
Supervisor: Fernando José de Carvalho Barão
Co-Supervisor: Maria Luísa Ferreira da Gama Velho Arruda

B.Sc. in **Engineering Physics** **Sep 2011**

TEACHING EXPERIENCE

Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal

Computational Physics

Laboratory classes for *B.Sc. in Physics Engineering*:

Feb 2022–Jul 2022 as a Teaching Assistant
Sep 2021–Feb 2022 as a Teaching Assistant
Sep 2020–Mar 2021 as a Teaching Assistant
Sep 2018–Feb 2019 as a Teaching Collaborator
Sep 2016–Feb 2017 as a Teaching Collaborator
Sep 2015–Feb 2016 as a Teaching Collaborator

Electromagnetism and Optics

Problem classes for *B.Sc. in Industrial Management and Engineering & B.Sc. in Telecommunications and Informatics Engineering*:

Sep 2020 — Mar 2021 as a Teaching Assistant

Laboratory classes for *B.Sc. Biomedics Engineering & B.Sc. Applied Mathematics to Computers*:

Feb 2018 — Jul 2018 as a Teaching Collaborator

Laboratory of Radiation and Atomic Physics — LFRA

Laboratory classes for *B.Sc. Physics Engineering*:

Sep 2017 — Feb 2018 as a Teaching Collaborator

Laboratory of Advanced Experimental Physics — LFEA

Laboratory classes for *B.Sc. Physics Engineering*:

May 2021 preparation and guidance of "Cosmic Ray Lab — LIP" set of experiments
May 2019 preparation and guidance of "Cosmic Ray Lab — LIP" set of experiments
May 2018 preparation and guidance of "Cosmic Ray Lab — LIP" set of experiments
May 2017 preparation and guidance of "Cosmic Ray Lab — LIP" set of experiments

May 2016 preparation and guidance of "Cosmic Ray Lab — LIP" set of experiments

Faculdade de Ciências, Universidade de Lisboa, Lisbon, Portugal

Advanced Formation of Teachers

"VI Encontro Internacional da Casa Das Ciências — VI International Meeting of the House of Sciences":

12 Jul 2019 Preparation of activities and guidance of attendees for the "VI Encontro Internacional da Casa Das Ciências — VI International Meeting of the House of Sciences" on the topic of "Experimentação com sensores, Raspberry Pis e programação Python — Experimenting with sensors, Raspberry Pi's and Python programming" for basic (7th-9th year) and high school teachers.

Tutoring

Private lessons **Nov 2019 — Feb 2023**

Students spanned over secondary, undergraduate, graduate, master's and doctoral levels.

Statistics for Scientific and Engineering degrees, Statistics applied to Finance, Statistics applied to Social Sciences, Topics of Statistical Inference
Econometrics
Physics for Scientific and Engineering degrees
Mathematics Calculus, Algebra
Time Series Analysis
Data Analysis coded in Python, C++, included Machine Learning
Web Scraping coded in Python & C++
Programming in C, C++ & Python

SUPERVISION EXPERIENCE

Università degli Studi di Perugia — UniPG, Perugia, Italy

Oct 2023 — Present — "The LxPG Model: A forecasting model for Galactic Cosmic Rays Variability and Orbital Radiation Risk Assessment in Space Missions", David Pelosi,
Dottorato di Ricerca in Fisica (PhD in Physics)
Role: Co-Supervisor

Nov 2023 — Apr 2024 — "Studio della variabilità dei raggi cosmici a varie scale temporali", Margherita Fioroni,
Laurea Magistrale in Fisica (M.Sc. in Physics)
Role: Co-Supervisor

Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal

Feb 2023 — Jul 2023 — "Time Variability of Cosmic Ray Fluxes", Rafael Parente,
1st Cycle Integrated Project in Engineering Physics — Bologna B.Sc. in Engineering Physics
Role: Co-Supervisor

LIP Internship Program

Jul 2022 — Oct 2022 — "Temporal variability of the cosmic-ray flux"
Jul 2019 — Sep 2019 — "Selection of Helium nuclei using multivariate data analysis in AMS"
Jul 2018 — Sep 2018 — "Solar modulation of cosmic rays — 1D Stochastic resolution"
Jul 2017 — Sep 2017 — "Solar modulation of cosmic rays — 1D Finite Difference"
Jul 2016 — Sep 2016 — "Selection of positrons in AMS and measurement of its differential rate (dN/dt.dRig)"

FELLOWSHIPS, GRANTS & AWARDS

Assegno di Ricerca (Scientific Research Grant) **Apr 2024 — present**

Title: "Study of cosmic radiation"
Position: Senior Level 2 Researcher
Funding: Istituto Nazionale di Fisica Nucleare, Perugia, Italy, ref. 26050/2023. Agreement ASI-INFN 2019-19-HH.0, its amendments. No. 2021-43-HH.0.

Assegno di Ricerca (Scientific Research Grant) **Apr 2023 — Apr 2024**

Title: "Studio fenomenologico della modulazione solare dei raggi cosmici galattici"

Position: Researcher
Funding: Dipartimento di Fisica e Geologia, Università degli Studi di Perugia, Perugia, Italy, ref. D.R. 3437 del 13.12.2022

Scientific Research Grant **01 Apr 2021 — 31 Aug 2021**
Study of solar modulation effects on cosmic ray fluxes measured by the AMS experiment
Position: PhD student
Funding: LIP — Laboratory of Instrumentation and Experimental Particle Physics, FCT — Fundação para a Ciência e Tecnologia, Portugal, ref. LIP/BI-05/2021, part of project CERN/FIS-PAR/0013/2019.

Ph.D. Grant **Mar 2015 — Mar 2019**
Study of solar modulation effects on cosmic ray fluxes measured by the AMS experiment
Position: PhD student
Funding: FCT — Fundação para a Ciência e Tecnologia, Portugal, ref. SFRH/BD/104462/2014.

Diploma for Teaching Excellence
2021/2022 — Computational Physics — Instituto Superior Técnico, Portugal
2020/2021 — Computational Physics — Instituto Superior Técnico, Portugal
2018/2019 — Computational Physics — Instituto Superior Técnico, Portugal
2016/2017 — Computational Physics — Instituto Superior Técnico, Portugal
2015/2016 — Computational Physics — Instituto Superior Técnico, Portugal

Refereed Journal Publications

The following papers were published in the following international peer-reviewed journals: **Physical Review Letters**, **Advances in Space Research** and **The Astrophysical Journal Letters**, with article [8] featured as a highlight on the AAS NOVA editor's choice. A complete reference list of the publications can be found on the INSPIRE database **here**.

34. D. Pelosi et al., "A forecasting framework for galactic cosmic ray flux in space weather applications", Advances in Space Research 76 (2025) 5700-5713, doi: 10.1016/j.asr.2025.08.022

33. P. Väisänen et al., "Simulation of Galactic cosmic ray proton fluxes with the daily modulation potential: Validation with AMS02 data for 2011-2019", Journal of Geophysical Research: Space Physics, 130 (2025), e2025JA033805, doi: 10.1029/2025JA033805

32. M. Aguilar et al. (AMS Collaboration), "Properties of Cosmic Lithium Isotopes Measured by the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 134 (2025) 20, 201001, doi: 10.1103/PhysRevLett.134.201001

31. M. Aguilar et al. (AMS Collaboration), "Antiprotons and Elementary Particles over a Solar Cycle: Results from the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 134 (2025) 051002, doi: 10.1103/PhysRevLett.134.051002

30. M. Aguilar et al. (AMS Collaboration), "Solar Modulation of Cosmic Nuclei over a Solar Cycle: Results from the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 134 (2025) 051001, doi: 10.1103/PhysRevLett.134.051001

29. M. Aguilar et al. (AMS Collaboration), "Properties of Cosmic Deuterons Measured by the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 132 (2024) 261001, doi: 10.1103/PhysRevLett.132.261001

28. M. Aguilar et al. (AMS Collaboration), "Temporal Structures in Positron Spectra and Charge-Sign Effects in Galactic Cosmic Rays", Phys. Rev. Lett. 131 (2023) 151002, doi: 10.1103/PhysRevLett.131.151002

27. M. Aguilar et al. (AMS Collaboration), "Properties of Cosmic-Ray Sulfur and Determination of the Composition of Primary Cosmic-Ray Carbon, Neon, Magnesium, and Sulfur: Ten-Year Results from the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 130 (2023) 211002, doi: 10.1103/PhysRevLett.130.211002

26. M. Aguilar et al. (AMS Collaboration), "Temporal Structures in Electron Spectra and Charge Sign Effects in Galactic Cosmic Rays", Phys. Rev. Lett. 130 (2023) 161001, doi: 10.1103/PhysRevLett.130.161001

25. M. Aguilar et al. (AMS Collaboration), "Properties of Daily Helium Fluxes", Phys. Rev. Lett. 128 (2022) 231102, doi: 10.1103/PhysRevLett.128.231102

24. M. Aguilar et al. (AMS Collaboration), "Periodicities in the Daily Proton Fluxes from 2011 to 2019 Measured by the Alpha Magnetic Spectrometer on the International Space Station from 1 to 100 GV", Phys. Rev. Lett. 127 (2021) 271102, doi: 10.1103/PhysRevLett.127.271102

23. M. Aguilar et al. (AMS Collaboration), "Properties of a New Group of Cosmic Nuclei: Results from the Alpha Magnetic Spectrometer on Sodium, Aluminum, and Nitrogen", Phys. Rev. Lett. 127 (2021) 021101, doi: 10.1103/PhysRevLett.127.021101

22. M. Aguilar et al. (AMS Collaboration), "Properties of Heavy Secondary Fluorine Cosmic Rays: Results from the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 126 (2021) 081102, doi: 10.1103/PhysRevLett.126.081102

21. M. Aguilar et al. (AMS Collaboration), "Properties of Iron Primary Cosmic Rays: Results from the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 126 (2021) 041104, doi: 10.1103/PhysRevLett.126.041104

20. M. Aguilar et al. (AMS Collaboration), "The Alpha Magnetic Spectrometer (AMS) on the international space station: Part II – Results from the first seven years", Phys. Rept. 894 (2020) 1-116, doi: 10.1016/j.physrep.2020.09.003

19. M. Aguilar et al. (AMS Collaboration), "Properties of Neon, Magnesium, and Silicon Primary Cosmic Rays Results from the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 124 (2020) 211102, doi: 10.1103/PhysRevLett.124.211102

18. M. Aguilar et al. (AMS Collaboration), "Properties of Cosmic Helium Isotopes Measured by the Alpha Magnetic Spectrometer", Phys. Rev. Lett. 123 (2019) 181102, doi: 10.1103/PhysRevLett.123.181102

17. N. Tomassetti, F. Barao, B. Bertucci, E. Fiandrini, M. Orcinha, "Numerical modeling of cosmic-ray transport in the heliopshere and interpretation of proton and helium fluxes in Solar Cycle 24", Advances in Space Research 64 (2019) 2477-2489, doi: 10.1016/j.asr.2019.06.025

16. M. Aguilar et al. (AMS Collaboration), "Towards Understanding the Origin of Cosmic-Ray Electrons", Phys. Rev. Lett. 122 (2019) 101101, doi: 10.1103/PhysRevLett.122.101101

15. M. Aguilar et al. (AMS Collaboration), "Towards Understanding the Origin of Cosmic-Ray Positrons", Phys. Rev. Lett. 122 (2019) 041102, doi: 10.1103/PhysRevLett.122.041102

14. N. Tomassetti, F. Barao, B. Bertucci, E. Fiandrini, J. L. Figueiredo, J. B. Lousada, M. Orcinha, "Testing Diffusion of Cosmic Rays in the Heliosphere with Proton and Helium Data from AMS", Phys. Rev. Lett. 121 (2018) 251104, doi: 10.1103/PhysRevLett.121.251104

13. M. Aguilar et al. (AMS Collaboration), "Precision Measurement of Cosmic-Ray Nitrogen and its Primary and Secondary Components with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 121 (2018) 051103, doi: 10.1103/PhysRevLett.121.051103

12. M. Aguilar et al. (AMS Collaboration), "Observation of Complex Time Structures in the Cosmic-Ray Electron and Positron Fluxes with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 121 (2018) 051102, doi: 10.1103/PhysRevLett.121.051102

11. M. Aguilar et al. (AMS Collaboration), "Observation of Fine Time Structures in the Cosmic Proton and Helium Fluxes with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 121 (2018) 051101, doi: 10.1103/PhysRevLett.121.051101

10. M. Aguilar et al. (AMS Collaboration), "Observation of New Properties of Secondary Cosmic Rays Lithium, Beryllium, and Boron by the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 120 (2018) 021101, doi: 10.1103/PhysRevLett.120.021101

9. M. Aguilar et al. (AMS Collaboration), "Observation of the Identical Rigidity Dependence of He, C, and O Cosmic Rays at High Rigidities by the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 120 (2017) 021101, doi: 10.1103/PhysRevLett.119.251101

8. N. Tomassetti, M. Orcinha, F. Barao, B. Bertucci, "Evidence for a Time Lag in Solar modulation of galactic cosmic rays", ApJL, 849 (2017) L32, doi: 10.3847/2041-8213/aa9373

7. M. Aguilar et al. (AMS Collaboration), "Precision Measurement of the Boron to Carbon Flux Ratio in Cosmic Rays from 1.9 GV to 2.6 TV with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 117 (2016) 231102, doi: 10.1103/PhysRevLett.117.231102

6. M. Aguilar et al. (AMS Collaboration), "Antiproton Flux, Antiproton-to-Proton Flux Ratio, and Properties of Elementary Particle Fluxes in Primary Cosmic Rays Measured with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 117 (2016) 091103, doi: 10.1103/PhysRevLett.117.091103

5. M. Aguilar et al. (AMS Collaboration), "Precision Measurement of the Helium Flux in Primary Cosmic Rays of Rigidities 1.9 GV to 3 TV with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 115 (2015) 211101, doi: 10.1103/PhysRevLett.115.211101

4. M. Aguilar et al. (AMS Collaboration), "Precision Measurement of the Proton Flux in Primary Cosmic Rays from Rigidity 1 GV to 1.8 TV with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 114 (2015) 171103, doi: 10.1103/PhysRevLett.114.171103

3. L. Accardo et al. (AMS Collaboration), "High Statistics Measurement of the Positron Fraction in Primary Cosmic Rays of 0.5-500 GeV with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett. 113 (2014) 121101, doi: 10.1103/PhysRevLett.113.121101

2. M. Aguilar et al. (AMS Collaboration), "Electron and Positron Fluxes in Primary Cosmic Rays Measured with the Alpha Magnetic Spectrometer on the International Space Station", Phys. Rev. Lett., 113 (2014) 121102, doi: 10.1103/PhysRevLett.113.121102

1. M. Aguilar et al. (AMS Collaboration), "Precision Measurement of the (e++e-) Flux in Primary Cosmic Rays from 0.5 GeV to 1 TeV with the Alpha Magnetic Spectrometer on the International Space Station", Phys.Rev.Lett. 113 (2014) 221102, doi: 10.1103/PhysRevLett.113.221102

CONFERENCE PROCEEDINGS

5. N. Tomassetti et al. Modeling the heliospheric modulation of cosmic-ray particles and antiparticles in light of new multichannel data from AMS-02 in space. Proceedings of 39th International Cosmic Ray Conference (2025) — PoS(ICRC2025), 1371. doi:10.22323/1.501.1371

4. D. Pelosi et al. Analysis of Galactic Cosmic Ray Variability and Time-Lagged Relation to Solar Activity. Proceedings of 39th International Cosmic Ray Conference (2025) — PoS(ICRC2025), 1353. doi:10.22323/1.501.1353

3. M. Orcinha, F. Barão, B. Bertucci, E. Fiandrini, D. Pelosi and N. Tomassetti, "Understanding variations of galactic energetic particles in the heliosphere: modelling and radiation hazard assessment", Cent. Eur. Astrophys. Bull. 48 (2024), (awaiting publication), The 28th European Cosmic Ray Symposium — ECRS 2024, Hvar, Croatia, 23-27 September 2024, doi: 10.48550/arXiv.2509.11837

2. D. Pelosi, F. Barão, B. Bertucci, E. Fiandrini, M. Orcinha, A. Reina Conde and N. Tomassetti, "Cross-correlation analysis for cosmic ray flux forecasting", EPJ Web Conf. 319 (2025) 13004, Roma International Conference on AstroParticle Physics — RICAP-24, Frascati, Italy, 23-27 September 2024, doi: 10.1051/epjconf/202531913004

1. M. Orcinha, N. Tomassetti, F. Barão and B. Bertucci, "Observation of a time lag in solar modulation of cosmic rays in the heliosphere", J. Phys.: Conf. Ser. 1181 (2019) 1, 012013, doi: 10.1088/1742-6596/1181/1/012013
26th Extended European Cosmic Ray Symposium and 35th Russian Cosmic Ray Conference, Barnaul — Belokurikha — Altai Mountains, Russia, 6-10 July 2018

Conference & workshop presentations

Contributed talks at international conferences and workshops

30 Oct 2025 "Cosmic radiation near Earth: Impact of solar activity and the geomagnetic field in long-term modelling of dose from cosmic radiation in space", M. Orcinha, F. Barão, B. Bertucci, E. Fiandrini, D. Pelosi, N. Tomassetti, 27-31 Octobre 2025, European Space Weather Week — ESWW2025, Umeå, Sweden

28 Oct 2025 "Solar Activity and Galactic Cosmic Rays: A Comprehensive Model for Long-Term Forecasting", D. Pelosi, F. Barão, B. Bertucci, E. Fiandrini, M. Orcinha, N. Tomassetti, 27-31 Octobre 2025, European Space Weather Week — ESWW2025, Umeå, Sweden

17 July 2025 "Modeling the heliospheric modulation of cosmic-ray in light of new data from AMS-02 in space", N. Tomassetti and A. Reina Conde and B. Bertucci and D. Pelosi and E. Fiandrini F. Barao and F. Faldi and M. Orcinha, 14-24 July 2025, International Cosmic-Ray Conference — ICRC2025, Geneva, Switzerland

16 July 2025 "Temporal Evolution of the Daily Proton and Helium Fluxes with AMS-02", F. Faldi and M. Orcinha and D. Pelosi, on Behalf of AMS-02 Collaboration, 14-24 July 2025, International Cosmic-Ray Conference — ICRC2025, Geneva, Switzerland

8 Nov 2024 "Long-term variations of cosmic rays in the heliosphere: modelling, forecasting and radiation hazard assessment", M. Orcinha, F. Barão, B. Bertucci, F. Faldi, E. Fiandrinni, D. Pelosi, N. Tomassetti, P. Väisänen, European Space Weather Week 2024 — ESWW2024, Coimbra, Portugal

25 Sep 2024 "Precision measurement of periodicities in the daily proton fluxes with the alpha magnetic spectrometer", M. Orcinha on behalf of AMS collaboration, 28th European Cosmic Ray Symposium — ECRS2024, Hvar, Croatia

23 Sep 2024 "An effective and predictive model for the long-term variations of Cosmic Rays in the Heliosphere", M. Orcinha, F. Barão, B. Bertucci, E. Fiandrinni, D. Pelosi, A. Reina Conde, N. Tomassetti, 28th European Cosmic Ray Symposium — ECRS2024, Hvar, Croatia

7 Jul 2018 "Observation of a time lag in solar modulation of cosmic rays in the heliosphere", M. Orcinha, F. Barão, B. Bertucci, N. Tomassetti, 26th Extended European Cosmic Ray Symposium and 35th Russian Cosmic Ray Conference — ECRS+RCRC 2018, 18

Contributed talks at national conferences and workshops

2 Jul 2019 "Study of solar modulation effects on cosmic ray fluxes measured by the AMS experiment", 5th IDPASC/LIP Students Workshop, University of Minho, Braga, Portugal

17 Feb 2018 "AMS — Solar modulation in the AMS era", "Jornadas do LIP" — LIP National Workshop, Évora, Portugal

24 Mar 2017 "Solar modulation of the galactic cosmic-ray flux", LIP PhD Student's workshop, University of Coimbra, Coimbra, Portugal

20 Oct 2015 "Short-term structures in the AMS-02 proton flux", IDPASC Workshop on "Space Particles and Earth", University of Évora, Évora, Portugal

Scientific Collaboration Talks

27 Mar 2024 "Geomagnetic cutoff rigidity for dose studies & AMS daily flux", M. Orcinha, Particle Astrophysics Perugia Group Meeting, Università degli Studi di Perugia — UniPG, Perugia, Italy

7 Dec 2023 "Wavelet analysis of the daily proton flux", M. Orcinha, Particle Astrophysics Perugia Group Meeting, Università degli Studi di Perugia — UniPG, Perugia, Italy

30 Nov 2023 "Temporal variability of the cosmic-ray flux", M. Orcinha, AMS Italia meeting, TIFPA — Trento Institute for Fundamental Physics and Applications, Trento, Italy

17 Nov 2023 "Optimization of Cutoff using differential acceptance — Bartel proton flux", M. Orcinha, AMS Low-Energy meeting, Perugia, Italy

1 Mar 2018 "Solar Modulation Studies with Protons", M. Orcinha, F. Barão, L. Derome, N. Tomassetti, AMS Collaboration General Analysis Meeting — Low Energy, Geneva, Switzerland

Poster sessions

14 Jul 2025 "Analysis of Time Variability of Galactic Cosmic Rays", D. Pelosi and F. Barão and B. Bertucci and F. Faldi and E. Fiandrini and M. Orcinha and N. Tomassetti and P. Väisänen and R. C. Venterea, 14-24 July 2025, International Cosmic-Ray Conference — ICRC2025, Geneva, Switzerland

05 Nov 2024 "Properties of Solar Energetic Particles with AMS-02 on the International Space Station", F. Faldi, B. Bertucci, N. Tomassetti, M. Orcinha, 04-08 November 2024, European Space Weather Week — ESWW2024, Coimbra, Portugal

23 Sep 2024 "An effective and predictive model for the long-term variations of Cosmic Rays in the Heliosphere", D. Pelosi, F. Barão, B. Bertucci, E. Fiandrinni, M. Orcinha, A. Reina Conde, N. Tomassetti, 23-27 September 2024, RICAP24, Frascati, Italy

14 Apr 2024 "An effective and predictive model for the long-term variations of Cosmic Rays in the Heliosphere", D. Pelosi, F. Barão, B. Bertucci, E. Fiandrinni, M. Orcinha, A. Reina Conde, N. Tomassetti, 14–19 April 2024, European Geosciences Union — EGU, Vienna, Austria

14 Apr 2024 "Daily heliospheric modulation potential (V23) and modelled GCR dataset compared to space measurements of the GCR energy spectrum", P. Väisänen, B. Bertucci, N. Tomassetti, M. Orcinha, M. Duranti, S. Koldobskiy and I. Usoskin, 14–19 April 2024, European Geosciences Union — EGU, Vienna, Austria

3 Apr 2024 "Recent low-energy results from the Alpha Magnetic Spectrometer on the International Space Station and their interpretations", Incontri di Fisica delle Alte Energie — IFAE, Istituto degli Innocenti, Firenze, Italia

14 Sep 2023 "An effective and predictive model for the long-term variations of Cosmic Rays in the Heliosphere", F. Barão, B. Bertucci, E. Fiandrinni, M. Orcinha, D. Pelosi, A. Reina Conde, N. Tomassetti, 14 September 2023, 109 Congresso Nazionale, Società Italiania di Fisica, Salerno, Italy

6 Jul 2018 "Precision Measurement of the Monthly Cosmic Ray Fluxes with the Alpha Magnetic Spectrometer on the ISS", 26th Extended European Cosmic Ray Symposium and 35th Russian Cosmic Ray Conference, Altai State University, Barnaul & Belokurikha, Russia

12 Oct 2017 "Solar Modulation of Galactic Cosmic-Rays", Técnico Lisboa Research Activity during the Top Industrial Managers Europe General Assembly, 1

5-6 Apr 2017 "Solar Modulation of Galactic Cosmic-Rays", IST PhD OpenDays, Instituto Superior Técnico, Lisboa, Portugal

ADVANCED EDUCATION

Participation in international schools

Oct 2024 "XV INFN International School on Efficient Scientific Computing — ESC24", INFN & INFN Padova & INFN CNAF & Next-Generation Triggers, Bertinoro, Italy

Sep 2015 "3rd International Summer School on INtelligent Signal Processing for FrontIEr Research and Industry — INFIERI", University of Hamburg & Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany

KNOWLEDGE TRANSFER

Invited talks at academic institutions

22 Nov 2024 "Radiazioni nello spazio: rischi, dosi e schermature", Part of the course "Fisica dello Spazio", taught by Nicola Tomassetti for the BSc and MSc in Physics of Dipartimento di Fisica e Geologia of Università degli Studi di Perugia, Italy

10 Jul 2024 "Introduction to Flux Estimation in AMS-02", Seminar for PhD students and Researchers, Dipartimento di Fisica e Geologia of Università degli Studi di Perugia, Italy

20 Dec 2018 "Parallelization of Code in Physics — An introduction to Parallelization & MPI", Seminar for the course of "Computational Physics", taught by Fernando Barão, for the MSc in Physics Engineering of Instituto Superior Técnico, Instituto Superior Técnico, Lisboa, Portugal

14 Dec 2018 "Parallel Selection of Protons in AMS — Optimizing data selection with Open MPI", Seminar for the course of "Programming for Cluster and Multicore", taught by Alcides Fonseca, for the MSc in Computer Science of the Faculty of Sciences of the University of Lisbon, Faculdade de Ciências da Universidade de Lisboa, Lisboa Portugal

12 Jul 2017 "A experiência AMS — Efeito do vento Solar", IDPASC Workshop "Hands on Particles and Light", Instituto Superior Técnico, Lisboa, Portugal

14 Jul 2016 "Introdução a ROOT", IDPASC Workshop "Hands on Particles and Light", Instituto Superior Técnico, Lisboa, Portugal

15 Jul 2016 "A experiência AMS — Efeito do vento Solar", IDPASC Workshop "Hands on Particles and Light", Instituto Superior Técnico, Lisboa, Portugal

29 Mar 2016 "Overview of the Solar Modulation Phenomenon", Laboratoire de Physique Subatomique et de Cosmologie — CNRS, Grenoble, France

Outreach initiatives

26 Sep 2025 Participation on "Particelle nella Nebbia", made for SHARPER — the EU's Researcher's Night 2025, organized by INFN and Dept. of Physics & Geology of Università degli Studi di Perugia — UniPG, Perugia, Italy

26 Nov 2024 Participation on "International Cosmic Day" (ICD-2024), organized by INFN-Perugia and Dept. of Physics & Geology of Università degli Studi di Perugia — UniPG, Perugia, Italy. Nationally coordinated by the newtork OCRA — Outreach Cosmic Ray Activities

20 Nov 2023 Participation on "International Cosmic Day" (ICD-2023), organized by INFN-Perugia and Dept. of Physics & Geology of Università degli Studi di Perugia — UniPG, Perugia, Italy. Nationally coordinated by the newtork OCRA — Outreach Cosmic Ray Activities

30 Sep 2023 Participation on "Particelle nella Nebbia", made for SHARPER — the EU's Researcher's Night 2023, organized by INFN and Dept. of Physics & Geology of Università degli Studi di Perugia — UniPG, Perugia, Italy

13 May 2022 Presented the lecture titled "Alpha Magnetic Spectrometer — A cosmic-ray observatory in space" for the *Seventh Lisbon mini-school on Particle and Astroparticle Physics*, Oeiras, Portugal

9 Mar 2022 Presented the lecture titled "Alpha Magnetic Spectrometer — A cosmic-ray observatory in space" for the *Jornadas da Engenharia Física do Técnico — Inside Views*, LIP — Lisboa, Portugal

7 Feb 2020 Presented the lecture titled "Alpha Magnetic Spectrometer — A cosmic-ray observatory in space" for the *Fifth Lisbon mini-school on Particle and Astroparticle Physics*, Costa da Caparica, Portugal

9 May 2018 Presented the lecture titled "LIP — Das profundezas da terra ao espaço (The AMS Experiment)" for the *32° aniversário do LIP*, Laboratório de Instrumentação e Física Experimental de Partículas, Lisboa, Portugal

22 Nov 2017 Presented the lecture titled "A Escuridão do Espaço — Matéria Escura e AMS" for the *A Semana da Ciência e Tecnologia no LIP*, Laboratório de Instrumentação e Física Experimental de Partículas, Lisboa, Portugal

SCIENTIFIC PROJECTS

AMS — Alpha Magnetic Spectrometer **May 2024 - present**

Title: Progetto ASI AMS-02 Missione Scientifica Analisi Dati
Funding: ASI — Agenzia Spaziale Italiana, ref. ASI-INFN 2019-19-HH.0, its amendments. No. 2021-43-HH.0.
Role: Researcher

CAESAR **Apr 2023 - May 2024**

Title: CAESAR — Comprehensive spAce wEather Studies for the ASPIS prototype Realization
Funding: INAF-ASI — Instituto Nazionale di Astrofisica, Agenzia Spaziale Italiana, Italy, ref. 2020-35-HH.0
Role: Researcher

AMS - Alpha Magnetic Spectrometer **2021 - 2023**
Title: Collaboration in the International Space Station experiment AMS for the detection of intermediate energy cosmic rays
Funding: FCT — Fundação para a Ciência e Tecnologia, Portugal, ref. CERN/FIS-PAR/0007/2021
Role: Researcher & Ph.D. Student (formerly)

AMS — Alpha Magnetic Spectrometer **2019 - 2021**
Title: Collaboration in the International Space Station experiment AMS for the detection of intermediate energy cosmic rays
Funding: FCT — Fundação para a Ciência e Tecnologia, Portugal, ref. CERN/FIS-PAR/0013/2019
Role: Ph.D. Student

AMS — Alpha Magnetic Spectrometer **2017 - 2019**
Title: Collaboration in the International Space Station experiment AMS for the detection of intermediate energy cosmic rays
Funding: FCT — Fundação para a Ciência e Tecnologia, Portugal, ref. CERN/FIS-PAR/0020/2017
Role: Ph.D. Student

AMS — Alpha Magnetic Spectrometer **2011 - 2014**
Title: Detection of intermediate energy cosmic rays with the AMS experiment
Funding: FCT — Fundação para a Ciência e Tecnologia, Portugal, ref. PTDC/FIS /122567/2010
Role: M.Sc. Student

Other scientific activities

Current Scientific positions & Memberships

2023 - present — **Associated Researcher** of the Istituto Nazionale di Fisica Nucleare — INFN, Perugia, Italy

2024 - present — **INFN Fellow** of the Istituto Nazionale di Fisica Nucleare — INFN, Perugia, Italy

2023 - 2024 — **Assegnista di Ricerca** of the Università degli Studi di Perugia — UniPG, Perugia, Italy

2013 - present — **Associated Researcher** of Laboratório de Instrumentação e Física Experimental de Partículas — LIP, Lisboa, Portugal

2013 - present — **Member** of AMS — international scientific collaboration Alpha Magnetic Spectrometer

2013 - present — **Member** of CERN — the European Organization for Nuclear Research

Teaching positions

2020 - 2022 — **Teaching Assistant** at Instituto Superior Técnico, Lisbon, Portugal

2015 - 2019 — **Teaching Collaborator** at Instituto Superior Técnico, Lisbon, Portugal

Visits

March - June 2016 Laboratoire de Physique Subatomique et de Cosmologie — LPSC, Grenoble, France
Invited visiting researcher under colaboration with Professor Laurent Derome.

2013 - Present regular yearly short-term visits to CERN, Geneve, Switzerland

Service

2025 — Reviewer for American Astronomical Society (AAS)

2022 - present — AMS Collaboration — shifter for the TEE sub-detector group (TRD, ACC, TRK).

2013 - 2019 — AMS Collaboration — shifter for the PM sub-detector group (ECAL, TOF, RICH). RICH expert on-call from CERN area during shifts.

Personal Projects

Electronics

P4 September 2019 Design and development of the "ADC Stereo — Analog-to-Digital Converted Stereo", a wireless playback device (WiFi and Bluetooth) from an old Denon audio amplifier and radio receiver. It is a RaspberryPi-based system which

can receive audio from AirPlay or Bluetooth and can be controlled manually through the original analog interface. The interface is digitized using an Arduino Uno which communicates with the RaspberryPi through a USB serial connection. The user can also interact with the device through the LCD display.

P2 **June 2016** Design and development of an Arduino-based control system for a graduation project of students of the Universidade de Belas Artes de Lisboa. The object consisted of an acrylic cube which would glow and change colours as people in the exhibit room got closer or farther away from it. The control system used ultrasound sensors and an Arduino to control the RGB LED strips.

P1 **May 2015 - 2019** Participated on the design of a front end circuit board for a silicon photomultiplier for the AMU ("A Observar Muões" — "Observing Muons") project at LIP. Design and layout of a 4 layer board with signal amplification and pre-amplification, analog output, variable threshold and a digital output in the TTL and NIM norms.

Software design

P5 **Jan 2021** Design and development of a web scrapping platform for publicly available documents from Torre do Tombo's archive website for research purposes. Main focus of the research is the Portuguese Inquisition. A database of all inquisition processes has been created which includes partial treatment of bad inputs, linking of split partial entries and some statistical analysis of data.

P3 **Jan 2017** Design and development of a parallelization algorithm with natural workload balancing for the optimization of Proton event selection from AMS cosmic ray data. It was coded in C++ using Open MPI for the parallelization scheme and used AMS libraries, custom LIP libraries (file management and XRootD access) and a selection scheme designed by me.

Hardware & Software Skills

Programming & Scripting Languages

> C, C++
> PHP, HTML, CSS
> Python
> UNIX shell scripting (bash, dash, tcsh, zsh)
> GNU Make
> Markdown (GitHub and Emacs Muse flavours), Obsidian

Parallelization and Communication Technologies

> Message Passing Interface (OpenMPI implementation in C/C++ and mpi4py in Python)
> OpenMP
> CUDA
> TBB
> Threads
> Forks
> Inter-Process Communication (Signal, Message Queue, Socket, Shared Memory, Semaphores, Mutex, Conditions, MPI, Pipe)

Signal Processing

> Empirical Mode Decomposition
> Wavelet Transform
> Fourier Transform

Data Analysis

> Wolfram Mathematica
> ROOT — Data Analysis Framework, CERN
> TMVA — Toolkit for Multivariate Data Analysis with ROOT (Boosted Decision Trees, Perceptrons, ...)
> statsmodels
> Numpy
> Pandas

Data Structures

> ROOT files (C++ Object Oriented Storage)
> XML
> JSON
> CSV (and similar)
> SQL (MySQL)

Access, Extraction & Management of Data

> RAID
> XRootD, EOS
> CVMFS — CERN VM File System
> NFS
> Web Scrapping (GET & POST requests, HTML & JSON parsing)

Web, Serial & IoT Communication Protocols

> I^2C, SPI
> TCP, UDP, FTP, HTTP requests

Package Management Software

> Homebrew
> Apt (apt-get) — Advanced Packaging Tool

Project Management Software

> Trello

Virtualization Software

> VMWare
> VirtualBox

Version Control Software

> DVCS (Git) — GitHub, GitLab, Bitbucket
> VCS (CVS, SVN)

Text Editing and Productivity Software

> Vim, Emacs
> Sublime Text 4
> Visual Studio Code
> Atom text editor
> TeX (TeX, LaTeX 2_ε, BibTeX, Ti*k*Z, $\mathcal{A}\mathcal{M}\mathcal{S}$-LaTeX, MiKTeX, pdfLaTeX),
> Microsoft Office, OpenOffice.org, LibreOffice, Google Docs

Computer—Aided Design (CAD) Software

> Autodesk Eagle — PCB Design Software
> Fritzing
> Autodesk AutoCAD

Graphic Design Tools

> Boxy SVG
> Sip
> Inkscape
> Gimp

Operating Systems

> Microsoft Windows family
> Apple OSX
> Linux

Micro-Computers

> Arduino
> Raspberry Pi (2 Model A, B and B+, 3 Model B and B+)
> BeagleBoard (BeagleBone Black)

3D printing

> Creality Ender 3 V2