



## Dr. Mercedes Paniccia (Ph.D)

Senior Research Associate

Université de Genève,  
Département de Physique Nucléaire et Corpusculaire  
24 quai Ernest-Ansermet, CH-1211, Genève 4, Suisse  
Email: [mercedes.paniccia@unige.ch](mailto:mercedes.paniccia@unige.ch)  
Personal web page: <https://paniccia.web.cern.ch/paniccia/>  
ORCID ID: <https://orcid.org/0000-0001-8482-2703>

### Profile

Experimental astro-particle physicist, currently active in the study of cosmic rays through the analysis of data from the [AMS-02](#) experiment installed on the [international space station](#) ISS in May 2011, whose mission is expected to last for the entire life of the ISS (until 2030), and through the development of future experiments.

### Education:

University of Geneva, Switzerland – PhD in Physics, 2008 [link to the PhD Thesis](#)

Università “La Sapienza”, Roma, Italy – Master in Physics summa cum laude, 2003 [link to the Master Thesis](#)

Liceo scientifico statale, Priverno (LT), Italy - High school graduation, 60/60

### Employment history:

#### **SENIOR RESEARCH ASSOCIATE – UNIVERSITY OF GENEVA, SWITZERLAND - 2015 - TO DATE**

I am leading the [AMS](#) research group at the University of Geneva since 2017. I am member of the executive committee of the AMS international collaboration. In charge of supervising the PhD students with whom I work on data analysis of the AMS-02 experiment, focusing on measurements of nuclei fluxes in cosmic rays. I am also involved in the research and development of future instruments for the detection of cosmic rays in space, such as the [PAN](#) instrument for monitoring space radiation which has received funds from the European Commission (grant agreement 862044).

I have seven years experience in teaching undergraduate students: Computer programming course to Physics students at the University of Geneva ([link](#)), and an online course on particle physics presented both in French ([link](#)) and in English ([link](#)).

I carry out various activities to popularise science and promote science to young people. Since 2021, I am president of the selection committee for the Swiss national contest of the foundation “[Science et Jeunesse](#)” for the subject areas Mathematics & Informatics and Physics & Technology for the French-speaking area of Switzerland.

#### **VISITING PROFESSOR – SHANDONG INSTITUTE OF ADVANCED TECHNOLOGY, CHINA - OCT. 2023**

AMS data analysis activity in the framework of a five-year collaboration agreement with SDIAT [Link to SDIAT homepage](#)

#### **POST-DOCTORAL RESEARCHER, UNIVERSITY OF GENEVA; SWITZERLAND – 2012-2015**

Analysis of the data of the AMS-02 experiment.

Monitoring of the data taking activities of the AMS-02 detector at the CERN control center as shift leader.

Construction of the qualification model for the space X-ray detector [POLAR](#) installed on the Chinese space station [Tian Gong 2](#).

**POST-DOCTORAL RESEARCHER, LABORATOIRE DE PHYSIQUE DES PARTICULE D'ANNECY-LE-VIEUX (LAPP) CNRS, FRANCE – 2010-2012**

Software development for the AMS-02 data reconstruction and analysis program.

Monitoring of the data taking activities of the AMS-02 detector at the AMS control center at CERN: shift leader, electromagnetic calorimeter expert.

Commissioning and calibration of the electromagnetic calorimeter of the AMS-02 detector.

Software development for AMS-02 data reconstruction and analysis program.

Various missions to the NASA Kennedy Space Center, Cape Canaveral, Florida, and Johnson Space Center, Houston, Texas, in preparation for the launch of AMS-02 to the International Space Station, and following the launch, for data grab monitoring.

**INVITED RESEARCHER, UNIVERSITY OF GENEVA, SWITZERLAND – MAY 2010- AUGUST 2010**

Reconfiguration of the AMS-02 detector silicon tracer for long-term operation in space. Participation in pre-flight calibration tests of the AMS-02 detector at CERN in Geneva.

**POST-DOCTORAL RESEARCHER, LABORATORI NAZIONALI DI FRASCATI (LNF) DELL'ISTITUTO NAZIONALE DI FISICA NUCLEARE (INFN), ITALY – 2008- 2010**

Search for neutrino oscillations with the OPERA experiment at the Gran Sasso Underground National Laboratories (LNGS) of the Italian National Institute for Nuclear Physics (INFN).

Fine-tuning and commissioning of the emulsion scanning laboratory system of the OPERA experiment at the National Laboratories of Frascati (LNF).

**PHD STUDENT, UNIVERSITY OF GENEVA, SWITZERLAND – 2003- 2008**

Construction of the silicon tracer of the AMS-02 detector.

Analysis of AMS-01 detector data for the study of correlations between cosmic ray flux intensity and solar activity.

**SUMMER STUDENT CERN, GENEVA, SWITZERLAND – 2002**

Software development for the ATLAS detector at the CERN Large Hadron Collider (LHC).

## Supervision of young researchers and students:

Dr. Shahid Khan, postdoc, July 2023 - current

Manbing Li (PhD student) 2022 - current

Erwan Robyn (PhD student) 2020-2023, Univ. Genève, 2023 - Sc. 5759 - 2023/08/30

<https://doi.org/10.13097/archive-ouverte/unige:171532>

Drini Marchese, Internship 2023, Bachelor student at University of Geneva

Randy Dobler, Summer student 2022, Bachelor student at University of Geneva

Martina D'Arco, Thesis 2022, Bachelor student at University of Rome "La Sapienza", Italy

Jiahui Wei (PhD student) 2017-2021, Univ. Genève, 2021 - Sc. 5582 - 2021/08/24

<https://doi.org/10.13097/archive-ouverte/unige:155018>

Zhen Liu (PhD student) 2017-2021, Univ. Genève, 2021 - Sc. 5571 - 2021/07/06 <https://doi.org/10.13097/archive-ouverte/unige:153814>

Yao Chen (PhD student) 2016-2020, Univ. Genève, 2020 - Sc. 5481 - 2020/07/27

<https://doi.org/10.13097/archive-ouverte/unige:142602>

Lanxing Li, Summer student 2019, Bachelor student at Nankai University (P. R. China)  
Xiangyu Xu, Summer student 2019, Bachelor student at Nankai University (P. R. China)  
Jialin Wu, Summer student 2018, Bachelor student at Nankai University (P. R. China)  
Ning Qin, Summer student 2018, Bachelor student at Nankai University (P. R. China)  
Marion Habiby (PhD student ) 2012-2016 , Univ. Genève, 2016 - Sc. 4912 - 2016/03/21  
<https://archive-ouverte.unige.ch/unige:83990>

## Seminars:

I have been invited to hold seminars in various universities and research institutes:

EPFL - Lausanne, Switzerland, 12 December 2022 [link](#)  
University of Bristol, UK, 16 March 2022  
Wichita State University , USA, 24 March 2021  
European Council for Nuclear Research (CERN), Switzerland, 21 January 2021, [link](#)  
University of Sussex, UK, 12 November 2020  
University of Sheffield, UK, 9 November 2020, [link](#)  
Università di Roma "La Sapienza", Italy, 4 November 2019 [link](#)  
University College London (UCL) ,UK, 10 February 2017 [link](#)  
University of Liverpool, UK, 8 February 2017, [link](#)

## Talks at International Scientific Conferences:

I have presented my research activities at various international scientific conferences:

COSPAR 2022, 44th Scientific Assembly ( [link](#)), Athens (Greece), July 2022  
Les Rencontres de Physique de la Vallée d'Aoste ([link](#)), La Thuile (Italy), March 2022  
17th International Conference on Topics in Astroparticle and Underground Physics, [TAUP2021](#) ,virtual event, September 2021  
40th International Conference on High Energy Physics [ICHEP2020](#) , virtual event  
16th International Conference on Topics in Astroparticle and Underground Physics, [TAUP2019](#), Toyama (Japan), September 2019  
3rd SuGAR Workshop, [SuGAR2018](#) , Brussels, Belgium, January 2018  
13th Symposium on Cosmology and Particle Astrophysics, [CosPA2016](#) , Sydney, Australia, November 2016  
7th International Workshop on the interconnection between Particle Physics and Cosmology [PPC2014](#), León, Guanajuato, Mexico  
33rd Russian Cosmic Rays Conference, [RCR2014](#) , Dubna, Russia, August 2014

## Organisation of International conferences:

ICRC-2023 Appointed as member of the International Scientific Program Committee for the "Cosmic Ray Direct" session <https://www.icrc2023.org/contact/#international-scientific-program-committee-ispc>

ICHEP-2022 Appointed as convener for the "Astroparticle Physics and Cosmology" session <https://agenda.infn.it/event/28874/program>

TeVPA 2016 Member of the local organising committee

## Research grants:

2019-2021: Swiss National Science Foundation grant 200020\_188667 shared with Prof. Xin WU for the project "Astroparticle Physics in Space: AMS, DAMPE, POLAR and Future Missions"

## Peer-Review activity:

Member of the Register of Expert Peer Reviewers for Italian Scientific Evaluation (REPRISE) <https://reprise.cineca.it/en>

Associate Editor for High-Energy and Astroparticle Physics for the scientific journals Frontiers in Astronomy and Space Sciences and Frontiers in Physics <https://loop.frontiersin.org/people/1320675/overview>

## Recent outreach activity:

CERN EP newsletter Sep. 2022 <https://ep-news.web.cern.ch/content/10-years-operating-alpha-magnetic-spectrometer-international-space-station>

CERN EP newsletter March 2021 <https://ep-news.web.cern.ch/content/latest-results-ams-international-space-station>

Live event on facebook [Space4Women](#) Show series #47 : [link](#)

Live event for the CERN Dark Matter Day, 30 October 2020: [link](#)

Interview to the Italian National Radio Radio3 Scienza 6 February 2020

Seminar at the Geneva Senior University Uni3, 15 October 2019: [link](#)

Seminar and debate with students of the "Aiglon College" Villars, Switzerland

Web live event from CERN to comment the spacewalks for AMS of astronauts Luca Parmitano (ESA) and Andrew Morgan (NASA) : [2 December](#) and [15 November 2019](#)

More on my outreach activity can be found at the link below:

<https://paniccia.web.cern.ch/paniccia/Outreach.html>

## Publications:

I have authored about 45 publications in peer-reviewed journals and about 20 articles in proceedings of international scientific conferences.

Full list of my publications <https://www.scopus.com/authid/detail.uri?authorId=56266617500>

### **LIST OF MOST RECENT PUBLICATIONS:**

#### **BOOK:**

**Cosmic Ray Physics : An introduction to the cosmic laboratory**

V. Bindi, [M. Paniccia](#), and M. Pohl. CRC Press 2023

<https://doi.org/10.1201/9781003181385>

#### **ARTICLES in International peer-reviewed scientific journals:**

- |             |   |
|-------------|---|
| <b>2023</b> | <b>Temporal Structures in Positron Spectra and Charge-Sign Effects in Galactic Cosmic Rays</b><br>M. Aguilar et al [AMS Collaboration, more than 50 co-authors].<br>Published in Phys.Rev.Lett. 131, 151002, 2023 <a href="https://doi.org/10.1103/PhysRevLett.131.151002">https://doi.org/10.1103/PhysRevLett.131.151002</a> |
| <b>2023</b> | <b>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</b><br>M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  |

- Published in Phys.Rev.Lett. 130, 211002, **2023** <https://doi.org/10.1103/PhysRevLett.130.211002>
- 2023** **Temporal Structures in Electron Spectra and Charge Sign Effects in Galactic Cosmic Rays**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 130, 161001, **2023** <https://doi.org/10.1103/physrevlett.130.161001>  
**Selected as PRL Editors' Suggestion and Featured in Physics**
- 2022** **Properties of Daily Helium Fluxes**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 128, 231102, **2022** <https://doi.org/10.1103/PhysRevLett.128.231102>
- 2022** **Design of an Antimatter Large Acceptance Detector In Orbit (ALADInO)**  
O. Adriani et al [More than 50 co-authors].  
Published Instruments 6(2), 19, **2022** <https://doi.org/10.3390/instruments6020019>
- 2021** **Periodicities in the Daily Proton Fluxes from 2011 to 2019 measured by the Alpha Magnetic Spectrometer on the International Space Station**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 127, 271102, **2021** <https://doi.org/10.1103/PhysRevLett.127.271102>
- 2021** **Properties of a New Group of Cosmic Ray Nuclei: Results from the Alpha Magnetic Spectrometer on Sodium, Aluminum and Nitrogen**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 127, 021102, **2021** <https://doi.org/10.1103/PhysRevLett.127.021101>
- 2021** **Properties of Heavy Secondary Fluorine Cosmic Rays from the Alpha Magnetic Spectrometer**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 126, 081102, **2021** <https://doi.org/10.1103/PhysRevLett.126.081102>  
**Selected as PRL Editors' Suggestion**
- 2021** **Properties of Iron Primary Cosmic Rays: Results from the Alpha Magnetic Spectrometer**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 126, 041104, **2021** <https://doi.org/10.1103/PhysRevLett.126.041104>  
**Featured in Physics**
- 2021** **Tracking and separation of relativistic ions using Timepix3 with a 300um thick silicon sensor**  
P. Smolyanskiy, P.Azzarello, B. Bergmann, P. Burian, P. Broulim, L.Meduna, **M.Paniccia**, C.Perrina, S. Pospisil, X.Wu. Published in JINST 16, P01022, **2021** <https://doi.org/10.1088/1748-0221/16/01/P01022>
- 2021** **The Alpha Magnetic Spectrometer (AMS) on the International Space Station: Part II - results from the first seven years.**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Physics Reports, 894, pp 1-116, **2021** <https://doi.org/10.1016/j.physrep.2020.09.003>

- 2020 **Properties of Neon, Magnesium and Silicon Primary Cosmic Rays from the Alpha Magnetic Spectrometer**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 124, 211102, 2020 <https://doi.org/10.1103/PhysRevLett.124.211102>  
Selected as PRL Editors' Suggestion and Featured in Physics
- 2020 **Measurements of nuclear interaction cross sections with the Alpha Magnetic Spectrometer on the International Space Station.**  
Q. Yan, V. Choutko, A.Oliva, **M.Paniccia**. Published in Nuclear Physics A 996 121712, 2020  
<https://doi.org/10.1016/j.nuclphysa.2020.121712>
- 2019 **Properties of Cosmic Helium Isotopes Measured by the Alpha Magnetic Spectrometer**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 123, 181102, 2019 <https://doi.org/10.1103/PhysRevLett.123.181102>  
Selected as PRL Editors' Suggestion
- 2019 **Penetrating Particle ANALyser (PAN)**  
X.Wu, G.Ambrosi, P. Azzarello, B. Bergmann, B.Bertucci, F. Cadoux, M.Campbell, M.Duranti, M.Ionica, M.Kole, S.Krucker, G.Maehlum, D. Meier, **M.Paniccia**, L. Pinsky, C.Plainaki, S.Pospisil, T.Stein, P.A.Thonet, N.Tomassetti, A.Tykhonov. Published in Advances in Space Research 63, 8, 2672-2682 2019 <https://doi.org/10.1016/j.asr.2019.01.012>
- 2019 **Towards Understanding the Origin of Cosmic-Ray Electrons**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 122, 101101, 2019 <https://doi.org/10.1103/PhysRevLett.122.101101>
- 2019 **Towards Understanding the Origin of Cosmic-Ray Positrons**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 122, 041102, 2019 <https://doi.org/10.1103/PhysRevLett.122.041102>  
Selected as PRL Editors' Suggestion
- 2018 **Precision Measurement of Cosmic-Ray Nitrogen and its Primary and Secondary Components with the Alpha Magnetic Spectrometer on the International Space Station**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 121, 051103, 2018 <https://doi.org/10.1103/PhysRevLett.121.051103>
- 2018 **Observation of Complex Time Structures in the Cosmic-Ray Electron and Positron Fluxes with the Alpha Magnetic Spectrometer on the International Space Station**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].  
Published in Phys.Rev.Lett. 121, 051102, 2018 <https://doi.org/10.1103/PhysRevLett.121.051102>  
Selected as PRL Editors' Suggestion
- 2018 **Observation of Fine Time Structures in the Cosmic Proton and Helium Fluxes with the Alpha Magnetic Spectrometer on the International Space Station**  
M. Aguilar et al [AMS Collaboration, more than 50 co-authors].

Published in Phys.Rev.Lett. 121, 051101, 2018 <https://doi.org/10.1103/PhysRevLett.121.051101>

2018

**Observation of New Properties of Secondary Cosmic Rays  
Lithium, Beryllium and Boron by the Alpha Magnetic Spectrometer  
on the International Space Station**

M. Aguilar et al [AMS Collaboration, more than 50 co-authors].

Published in Phys.Rev.Lett. 120, 021101, 2018 <https://doi.org/10.1103/PhysRevLett.120.021101>

Selected as PRL Editors' Suggestion and Featured in Physics