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CURRICULUM VITAE

Personal Data

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Academic Employment

- *May 2015-present* Post-doctoral fellow at the RWTH Aachen University, Germany
- *January 2013-April 2015* Post-doctoral fellow at the Torino University, Torino, Italy
- *September 2009-December 2012* Post-doctoral fellow at the Stockholm University, Oskar Klein Center , Stockholm, Sweden
- *February 2007-August 2009* Post-doctoral fellow at Aarhus University, Aarhus, Denmark

Visits in other institutions

- *June-July 2005* Visiting PhD at the Instituto de Fisica Corpuscolar (IFIC), Valencia, Spain

- *November-December 2012* Visiting scientist at the International Centre for Theoretical Physics (ICTP), Trieste, Italy
- *January-February 2013* Visiting scientist at Roma Tor Vergata, physics department, Italy
- *May-June 2017* Visiting scientist, as Von Karman fellow, at Universidad Estadual Paulista (UNESP), South American Institute for Fundamental Research (ICTP-SAIFR), Sao Paulo, Brasil
- *August-December 2018* Visiting scientist at the Laboratoire d'Annecy-le-Vieux de Physique Thorique (LAPTh), Annecy-le-Vieux, France

Education

- *January 18, 2007* PhD thesis, University of Naples "Federico II", with a thesis entitled *High-energy Astronomy and Astrophysics with Cosmic Rays and Gamma particles.* PhD Advisors: Prof. G. Miele. and G. Mangano
- *October 15, 2003:* Master degree ("Laurea") in Physics, grade 110/110 summa cum laude, University of Naples "Federico II", with a thesis entitled *CMB anisotropies and cosmological parameters extraction from the WMAP experiment.* Supervisors: Prof. G. Miele and Dr. G. Mangano.

Seminars and Conferences

- Part of LOC and SOC of 4 conferences:
  Ist Workshop of Astronomy and Astrophysics for Students Napoli, Italy - April 2006, 30 participants;
  Cosmic Ray Backgrounds for Dark Matter Searches Stockholm, Sweden - Jan 2010, 49 participants;
  TeV Particle Astrophysics (TeVPA 2011) Stockholm, Sweden - August 2011, 132 participants;
  2014 ISAPP school for astroparticle physics (ISAPP 2014) , Torino, Italy - July 2014, 52 participants
- >50 conferences/workshops attended, contributing with presentation of results in >40 cases, and in >15 cases with invited talks.
- >30 seminars/colloquia in Institues in Europe, United States and South America

Teaching and Tutoring

- *2005* Assistant (of Prof. G. Miele) to the course on Fundamental Physics at the Faculty of Medicine at Università di Napoli "Federico II", Napoli, for a total of 20h (10 classes 2h each).

- *2008* Assistant (in charge of the exercise class) to the course on Cosmology at the Aarhus University, Denmark, for a total of 24h (8 classes 3h each).
- *2008* Co-supervisor (together with G. Miele) of one PhD student in Napoli, Dr. Enrico Borriello, on a Thesis on "Radio constraints on dark matter annihilation" (Thesis defended in January 2009).
- *2014-2015* Lecturer of the PhD course "Astrophysical signals of particle dark matter", for a total of 20h (10 classes 2h each), at the Doctoral School in Physics and Astrophysics of Torino University, academic year 2014-2015
- *2015-2016* Supervisor of two Master students in Aachen. Jan Burger on a Thesis on "Dark Matter Constraints from the intensity and anisotropy of the Cosmological gamma-ray background", and Michael Korsmaier on a Thesis on "New results on cosmic-rays and Dark Matter from a fit of AMS02 observations". Supervisor of one Bachelor student. Samuel Brieden on Thesis on "Analytical propagation of antiprotons in the Galaxy".
- *2016* Assistant (in charge of the exercise class) to the course on Astroparticle Physics at the University of Aachen, Germany, for a total of 26h (13 classes 2h each), + 4h of lectures in the course itself covering the topic "Dark Matter in the Universe, direct and indirect detection."
- *2016-2017* Supervisor of Master student Benjamin Stölzner in Aachen on a Thesis on "Dark Energy constraints from galaxy and gamma-ray cross-correlations with the cosmic microwave background".
- *2016-2017* Assistant (in charge of the exercise class) to the course on Statistical Mechanics at the University of Aachen, Germany, for a total of 26h (13 classes 2h each).
- *2017-2018* Assistant (in charge of the exercise class) to the course on General Relativity and Cosmology at the University of Aachen, Germany, for a total of 26h (13 classes 2h each).
- *2017-2018* Supervisor of Master student Paul Djatschenko in Aachen on a Thesis on "Dark Matter Searches in the extra-galactic gamma-ray sky".

Computer skills

Familiarity with Unix/Linux platforms, as well as Windows, Office (Word, Excel, Powerpoint).
Good Knowledge of *Mathematica*, *IDL* and *Matlab* data visualization and manipulation tools.
Good Knowledge of LaTeX typesetting tools.

Programming languages: Fortran 77/90, basics of C and C++.
Tools: Knowledge of HEALPix for the analysis of data-sets on the sphere

Grants and Awards

- *2009* Co-I (PI Jennifer Siegal-Gaskins) of the project "Characterization of Anisotropies in the gamma diffuse background for Dark Matter studies", awarded with the Fermi GI Program grant number NNX09AT74G (100,000$)
- *2015* Co-I (PI Elena Orlando) of the project "Linking LAT Gamma-Ray and Radio Observations of the Galactic Diffuse Emission Produced by Cosmic Rays ", awarded with the Fermi GI Program grant number NNX15AU79G, (55,000$)
- *2016* awarded with the "Theodore von Kàrmàn Fellowship for the visiting scholars programme for outgoing scientists", (4,000 eur.)

Habilitation

- *july 2017* (ita) Abilitazione Scientifica Nazionale (ASN) a professore di seconda fascia in Fisica Teorica delle Interazioni Fondamentali, Settore concorsuale 02/A2.
- *july 2017* (eng) Italian National Scientific Habilitation as second level professor (associate professor) in Theoretical Physics, released by italian Ministry of Science and Education (MIUR)
- *july 2018* (ita) Abilitazione Scientifica Nazionale (ASN) a professore di seconda fascia in Astronomia, Astrofisica, Fisica della Terra e dei Pianteti, Settore concorsuale 02/C1.
- *july 2018* (eng) Italian National Scientific Habilitation as second level professor (associate professor) in Astronomy and Astrophysics, released by italian Ministry of Science and Education (MIUR)

Miscellanea

- *2009 - present* Member of the Fermi-LAT collaboration as affiliated scientist
- Referee for JCAP, Astrophysical Journal, Journal of Physics G, Phys.Rev.D, Phys.Rev.Letters, Astroparticle Physics

Languages

Italian: native
English: fluent
Spanish: good comprehension of texts and spoken language, mild speech abilities

French/Swedish/Danish: mild comprehension of texts

Reference Contacts

- Prof. Jan Conrad (Stockholm University, Sweden – conrad@fysik.su.se)
- Prof. Gennaro Miele (Napoli University "'Federico II", Italy – miele@na.infn.it).
- Prof. Nicolao Fornengo (Torino University, Italy – fornengo@to.infn.it).
- Prof. Julien Lesgourgues (Aachen University, Germany – lesgourg@physik.rwth-aachen.de).
- Prof. Eiichiro Komatsu (Max-Planck-Institut für Astrophysik, Germany– komatsu@mpa-garching.mpg.de)

Research results

My research interests cover a wide range from Cosmology to Astroparticle physics. In particular I worked on Big Bang NucleoSynthesis (BBN), Cosmic Microwave Background (CMB) and Large Scale Structures; on Ultra-High Energy Cosmic Rays, gamma-ray and neutrino astronomy; and on indirect Dark Matter searches through radiation in the radio, x-ray and gamma-ray bands, and trough neutrinos and charged particles. I communicates easily with theoretical physicists, astrophysicists and cosmologists, as the list of co-authors and collaborators shows. The results of my work can be summarized into five mainstreams:

(i) CMB and LSS: I have worked for my Master Thesis on the estimation of cosmological parameters from the CMB-LSS in comparison with similar estimates from BBN only. The study brought to publication [42] which have now more than 120 citations. More recently, I have worked on the novel idea of looking for the Integrated Sacks-Wolfe imprint on data in the gamma-ray band [25].

(ii) Ultra High Energy Cosmic Rays (UHECRs): I have devoted several efforts to the study of UHECRs and the problem of their origin [30, 35, 38, 40] and possible applications like constraints on the Galactic Magnetic Field [36]. These studies are particularly timely as the Auger experiments is running and collecting more data.

(iii) High Energy Neutrinos (HENs): UHECRs and HENs are linked by a tight connection which can shed light on the origin of both. This link and the potentiality to explore it with the current ICECube experiment has been investigated in [32, 33, 39].

(iv) Indirect detection of Dark Matter: I have investigated various aspect of the subject, from DM signatures in gamma rays [17, 18, 28, 29, 34, 37], to the imprint in different frequencies as radio and x-rays [31], and signatures through neutrinos, antiprotons and electrons/positrons [26]. After joining the Fermi-LAT collaboration in 2009 I had several collaboration publications (see 'other papers', below), of two of which ([22, 24]) I am a contact author, i.e. a main contributing author.

(v) Global Fits: I study the constraints posed on DM particle physics models by simultaneously including in a consistent framework four-fold data from indirect detection,

direct detection, colliders and cosmology [15, 7]

Research papers published or submitted to refereed journals

As of April 2019 my total inSPIRE citation count is 5043 of which 4952 are in refereed journals, with an h-index of 34.

[1] A. Cuoco, J. Heisig, L. Klamt, M. Korsmeier and M. Krämer, "**Scrutinizing the evidence for dark matter in cosmic-ray antiprotons**," arXiv:1903.01472 [astro-ph.HE], PRD Accepted

[2] M. Benito, A. Cuoco and F. Iocco, "**Handling the Uncertainties in the Galactic Dark Matter Distribution for Particle Dark Matter Searches**," JCAP **1903** (2019) no.03, 033 arXiv:1901.02460 [astro-ph.GA].

[3] M. N. Mazziotta, F. Costanza, A. Cuoco, F. Gargano, F. Loparco and S. Zimmer, "**Search for Features in the Cosmic-Ray Electron and Positron spectrum measured by the Fermi Large Area Telescope**," Phys. Rev. D **98** (2018) no.2, 022006, arXiv:1712.07005 [astro-ph.HE].

[4] A. Cuoco, J. Heisig, M. Korsmeier and M. Krämer, "**Constraining heavy dark matter with cosmic-ray antiprotons**," JCAP **1804** (2018) no.04, 004, arXiv:1711.05274 [hep-ph].

[5] B. Stölzner, A. Cuoco, J. Lesgourgues and M. Bilicki, "**An Updated Tomographic Analysis of the Integrated Sachs-Wolfe Effect and implications for Dark Energy**," Phys. Rev. D **97** (2018) no.6, 063506, arXiv:1710.03238 [astro-ph.CO].

[6] A. Cuoco, M. Bilicki, J. Q. Xia and E. Branchini, "**Tomographic imaging of the Fermi-LAT gamma-ray sky through cross-correlations: A wider and deeper look**," Astrophys. J. Suppl. **232**, no. 1 (2017), arXiv:1709.01940 [astro-ph.HE].

[7] A. Cuoco, J. Heisig, M. Korsmeier and M. Krämer, "**Probing dark matter annihilation in the Galaxy with antiprotons and gamma rays**," JCAP **1710** (2017) no.10, 053, arXiv:1704.08258 [astro-ph.HE].

[8] E. Branchini, S. Camera, A. Cuoco, N. Fornengo, M. Regis, M. Viel and J. Q. Xia, "**Cross-correlating the gamma-ray sky with catalogs of galaxy clusters**,", Astrophys. J. Suppl. **228**, no. 1, 8 (2017), arXiv:1612.05788 [astro-ph.CO].

[9] E. Alvarez, A. Cuoco, N. Mirabal and G. Zaharijas, "**Searches for correlation between UHECR events and high-energy gamma-ray Fermi-LAT data**," JCAP **1612**, no. 12, 023 (2016), arXiv:1611.09869 [astro-ph.HE].

[10] A. Cuoco, M. Krämer and M. Korsmeier, "**Novel dark matter constraints from antiprotons in the light of AMS-02**," Phys. Rev. Lett. **118**, no. 19, 191102 (2017), arXiv:1610.0307. PRL synopsis: "Antiprotons May Hold Dark Matter Signal" https://physics.aps.org/synopsis-for/10.1103/PhysRevLett.118.191102

[11] M. Fornasa, A. Cuoco *et al.*, "**The angular power spectrum of the diffuse gamma-ray emission as measured by the Fermi Large Area Telescope and constraints on its Dark Matter interpretation**," Phys. Rev. D **94**, no. 12, 123005 (2016), arXiv:1608.07289 [astro-ph.HE].

[12] M. Korsmeier and A. Cuoco, "**Galactic cosmic-ray propagation in the light of AMS-02: I. Analysis of protons, helium, and antiprotons**," Phys. Rev. D **94**, no. 12, 123019 (2016), arXiv:1607.06093 [astro-ph.HE].

[13] H. S. Zechlin, A. Cuoco, F. Donato, N. Fornengo and M. Regis, " **Statistical Measurement of the Gamma-ray Source-count Distribution as a Function of Energy**," Astrophys. J. **826**, no. 2, L31 (2016), arXiv:1605.04256 [astro-ph.HE].

[14] E. Charles, M. Sanchez-Conde, B. Anderson, R. Caputo, A. Cuoco, *et al.* "**Sensitivity Projections for Dark Matter Searches with the Fermi Large Area Telescope**," Phys. Rept. **636** (2016) , 1, arXiv:1605.02016 [astro-ph.HE]. My main contribution is to the section on cosmological wimps searches, for which I derived the sensitivities, made the plots and written the text.

[15] A. Cuoco, B. Eiteneuer, J. Heisig and M. Kramer, "**A global fit of the γ-ray galactic center excess within the scalar singlet Higgs portal model**," JCAP**06**(2016)050, arXiv:1603.08228 [hep-ph].

[16] H. S. Zechlin, A. Cuoco, F. Donato, N. Fornengo and A. Vittino, "**Unveiling the Gamma-ray Source Count Distribution below the Fermi Detection Limit with Photon Statistics**," Astrophys. J. Suppl. **225**, no. 2, 18 (2016), arXiv:1512.07190 [astro-ph.HE].

[17] A. Cuoco, J. Q. Xia,, M. Regis, E. Branchini, N. Fornengo and M. Viel, "**Dark matter searches in the γ-ray extragalactic background via cross-correlations with galaxy catalogues**," Astrophys. J. Suppl. **221** (2015) 2, 29, arXiv:1506.01030 [astro-ph.HE].

[18] M. Regis, J. Q. Xia, A. Cuoco, E. Branchini, N. Fornengo and M. Viel, "**Particle dark matter searches outside the Local neighborhood**," Phys. Rev. Lett. **114** (2015) 24, 241301, arXiv:1503.05922 [astro-ph.CO].

[19] J. -Q. Xia, A. Cuoco, E. Branchini and M. Viel, "**Tomography of the Fermi-LAT γ-ray diffuse extragalactic signal via cross-correlations with galaxy catalogues**," Astrophys. J. Suppl. **217** (2015) 1, 15 [arXiv:1503.05918 [astro-ph.CO]], I made the analysis of gamma-ray data and wrote the related text.

[20] M. Di Mauro, A. Cuoco, F. Donato and J. M. Siegal-Gaskins, "**Fermi-LAT gamma-ray anisotropy and intensity explained by unresolved Radio-Loud Active Galactic Nuclei**," JCAP **11** (2014) 021, arXiv:1407.3275 [astro-ph.HE].

[21] J. Ripken, A. Cuoco, H. -S. Zechlin, J. Conrad and D. Horns, "**The sensitivity of Cherenkov telescopes to dark matter and astrophysical anisotropies in the diffuse gamma-ray background**," JCAP **01** (2014) 049, arXiv:1211.6922, I wrote most of the text and coordinated the work. I performed the analytic calculations and some of the simulations.

[22] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**Constraints on the Galactic Halo Dark Matter from Fermi-LAT Diffuse Measurements**," ApJ **761** (2012) 91, arXiv:1205.6474 [astro-ph.CO]. I am a contact author for this paper together with G. Zaharijas, Z. Yang and J. Conrad. I had the main idea and I have been the main coordinator of the project. I also performed a large part of the calculations and written most of the text.

[23] A. Cuoco, E. Komatsu and J. Siegal-Gaskins, "**Joint anisotropy and source count constraints on the contribution of blazars to the diffuse gamma-ray background,**" Phys. Rev. D **86** (2012) 063004, arXiv:1202.5309 [astro-ph.CO].

[24] M. Ackermann *et al.* [Fermi LAT Collaboration], "**Anisotropies in the diffuse gamma-ray background measured by the Fermi LAT**," Phys. Rev. D **85** (2012) 083007 arXiv:1202.2856 [astro-ph.HE]. I am a contact author for this paper together with T. Linden, M.N. Mazziotta, J.M. Siegal-Gaskins and V. Vitale. I have contributed at various levels: performing calculations, writing text and supervising.

[25] J. -Q. Xia, A. Cuoco, E. Branchini, M. Fornasa and M. Viel, "**A cross-correlation study of the Fermi-LAT γ-ray diffuse extragalactic signal**," Mon. Not. Roy. Astron. Soc. **416** (2011) 2247, arXiv:1103.4861 [astro-ph.CO].

[26] E. Borriello, L. Maccione and A. Cuoco, "**Dark matter electron anisotropy: a universal upper limit**," Astropart. Phys. **35** (2012) 537, arXiv:1012.0041 [astro-ph.HE].

[27] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**Searches for Cosmic-Ray Electron Anisotropies with the Fermi Large Area Telescope**," Phys. Rev. D **82** (2010) 092003, arXiv:1008.5119 [astro-ph.HE]. I contributed to this work supervising and cross-checking the anisotropy analysis performed with the multipole decomposition technique. I also contributed providing some theory prediction for the anisotropies from DM and writing some paragraphs of the paper.

[28] A. Cuoco, A. Sellerholm, J. Conrad and S. Hannestad, "**Anisotropies in the Diffuse Gamma-Ray Background from Dark Matter with Fermi LAT: a closer look**," Mon. Not. Roy. Astron. Soc. **414** (2011) 2040, arXiv:1005.0843 [astro-ph.HE].

[29] E. Borriello, A. Cuoco and G. Miele, "**Secondary radiation from the Pamela/ATIC excess and relevance for Fermi**," Astrophys. J. **699** (2009) L59, arXiv:0903.1852 [astro-ph.GA].

[30] A. Cuoco, S. Hannestad, T. Haugboelle, M. Kachelriess and P. D. Serpico, "**A global autocorrelation analysis of the Auger data**," Astrophys. J. **702** (2009) 825, arXiv:0809.4003 [astro-ph].

[31] E. Borriello, A. Cuoco and G. Miele, "**Radio constraints on dark matter annihilation in the galactic halo and its substructures**," Phys. Rev. D **79** (2009) 023518, arXiv:0809.2990 [astro-ph].

[32] A. Cuoco and S. Hannestad, "**Ultra-high energy Neutrinos from Centaurus A and the Auger hot spot**," Phys. Rev. D **78** (2008) 023007, arXiv:0712.1830 [astro-ph].

[33] E. Borriello, A. Cuoco, G. Mangano, G. Miele, S. Pastor, O. Pisanti and P. D. Serpico, "**Disentangling neutrino-nucleon cross section and high energy neutrino flux with a km^3 neutrino telescope**," Phys. Rev. D **77** (2008) 045019, arXiv:0711.0152 [astro-ph].

[34] A. Cuoco, J. Brandbyge, S. Hannestad, T. Haugboelle and G. Miele, "**Angular Signatures of Annihilating Dark Matter in the Cosmic Gamma-Ray Background**," Phys. Rev. D **77** (2008) 123518, arXiv:0710.4136 [astro-ph].

[35] A. Cuoco, S. Hannestad, T. Haugboelle, M. Kachelriess and P. D. Serpico, "**Clustering properties of ultrahigh energy cosmic rays and the search for their astrophysical sources**," Astrophys. J. **676** (2008) 807, arXiv:0709.2712 [astro-ph].

[36] A. Cuoco, G. Miele and P. D. Serpico, "**Astrophysical interpretation of the medium scale clustering in the ultrahigh energy sky**," Phys. Lett. B **660** (2008) 307, arXiv:0706.2864 [astro-ph].

[37] A. Cuoco, S. Hannestad, T. Haugbolle, G. Miele, P. D. Serpico and H. Tu, "**The Signature of Large Scale Structures on the Very High Energy Gamma-Ray Sky**," JCAP **0704** (2007) 013, astro-ph/0612559.

[38] A. Cuoco, G. Miele and P. D. Serpico, "**First hints of large scale structures in the ultrahigh energy sky?**," Phys. Rev. D **74** (2006) 123008, astro-ph/0610374.

[39] A. Cuoco, G. Mangano, G. Miele, S. Pastor, L. Perrone, O. Pisanti and P. D. Serpico, "**Ultrahigh Energy Neutrinos in the Mediterranean: Detecting v(tau) and v(mu) with a km**3 Telescope**," JCAP **0702** (2007) 007, astro-ph/0609241.

[40] A. Cuoco, R. D'Abrusco, G. Longo, G. Miele and P. D. Serpico, "**The footprint of large scale cosmic structure on the ultrahigh energy cosmic ray distribution**," JCAP **0601** (2006) 009, astro-ph/0510765.

[41] A. Cuoco, J. Lesgourgues, G. Mangano and S. Pastor, "**Do observations prove that cosmological neutrinos are thermally distributed?**," Phys. Rev. D **71** (2005) 123501, astro-ph/0502465.

[42] A. Cuoco, F. Iocco, G. Mangano, G. Miele, O. Pisanti and P. D. Serpico, "**Present status of primordial nucleosynthesis after WMAP: results from a new BBN code**," Int. J. Mod. Phys. A **19** (2004) 4431, astro-ph/0307213.

Other papers

Other Fermi-LAT and LSST papers to which I have contributed and I am author (but not main author):

[43] K. Bechtol *et al.*, "**Dark Matter Science in the Era of LSST**," arXiv:1903.04425 [astro-ph.CO].

[44] M. Ajello *et al.* [Fermi-LAT Collaboration], "**A Search for Cosmic-ray Proton Anisotropy with the Fermi Large Area Telescope**," arXiv:1903.02905 [astro-ph.HE].

[45] A. Drlica-Wagner *et al.* [LSST Dark Matter Group], "**Probing the Fundamental Nature of Dark Matter with the Large Synoptic Survey Telescope**," arXiv:1902.01055 [astro-ph.CO].

[46] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**Unresolved Gamma-Ray Sky through its Angular Power Spectrum**," Phys. Rev. Lett. **121** (2018) no.24, 241101 [arXiv:1812.02079 [astro-ph.HE]].

[47] M. Ajello *et al.*, "**Fermi-LAT Observations of LIGO/Virgo Event GW170817**," Astrophys. J. **861** (2018) no.2, 85.

[48] B. P. Abbott *et al.* "**Multi-messenger Observations of a Binary Neutron Star Merger**," Astrophys. J. **848** (2017) no.2, L12 [arXiv:1710.05833 [astro-ph.HE]].

[49] S. Abdollahi *et al.* [Fermi-LAT Collaboration], "**Cosmic-ray electron-positron spectrum from 7 GeV to 2 TeV with the Fermi Large Area Telescope**," Phys. Rev. D **95**, no. 8, 082007 (2017), arXiv:1704.07195 [astro-ph.HE].

[50] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**The Fermi Galactic Center GeV Excess and Implications for Dark Matter**," Astrophys. J. **840**, no. 1, 43 (2017), arXiv:1704.03910 [astro-ph.HE].

[51] S. Abdollahi *et al.* [Fermi-LAT Collaboration], "**Search for Cosmic-Ray Electron and Positron Anisotropies with Seven Years of Fermi Large Area Telescope Data**," Phys. Rev. Lett. **118**, no. 9, 091103 (2017), arXiv:1703.01073 [astro-ph.HE].

[52] M. Ajello *et al.* [Fermi-LAT Collaboration], "**3FHL: The Third Catalog of Hard Fermi-LAT Sources**," arXiv:1702.00664 [astro-ph.HE].

[53] J. L. Racusin *et al.*, "**Searching the Gamma-ray Sky for Counterparts to Gravitational Wave Sources: Fermi GBM and LAT Observations of LVT151012 and GW151226**," Astrophys. J. **835**, no. 1, 82 (2017), arXiv:1606.04901 [astro-ph.HE].

[54] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**Measurement of the high-energy gamma-ray emission from the Moon with the Fermi Large Area Telescope**," Phys. Rev. D **93** (2016) no.8, 082001 [arXiv:1604.03349 [astro-ph.HE]].

[55] F. Acero *et al.* [Fermi-LAT Collaboration], "**Development of the Model of Galactic Interstellar Emission for Standard Point-Source Analysis of Fermi Large Area Telescope Data**," Astrophys. J. Suppl. **223** (2016) no.2, 26 [arXiv:1602.07246 [astro-ph.HE]].

[56] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**Fermi-LAT Observations of the LIGO event GW150914**," Astrophys. J. **823** (2016) no.1, L2 [arXiv:1602.04488 [astro-ph.HE]].

[57] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**An extremely bright gamma-ray pulsar in the Large Magellanic Cloud**," Science **350** (2015) 6262, 801.

[58] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**2FHL: The Second Catalog of Hard Fermi-LAT Sources**," Astrophys. J. Suppl. **222** (2016) 1, 5, arXiv:1508.04449 [astro-ph.HE].

[59] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**Updated Search for Spectral Lines from Galactic Dark Matter Interactions with Pass 8 Data from the Fermi Large Area Telescope**," Phys. Rev. D **91** (2015) 12, 122002, arXiv:1506.00013 [astro-ph.HE].

[60] M. Ackermann *et al.* [Fermi-LAT Collaboration], "**Searching for Dark Matter Annihilation from Milky Way Dwarf Spheroidal Galaxies with Six Years of Fermi-LAT Data**," Phys. Rev. Lett. **115** (2015) 23, 231301, arXiv:1503.02641 [astro-ph.HE].

[61] M. Ackermann *et al.* [The Fermi LAT Collaboration], "**The spectrum of isotropic diffuse gamma-ray emission between 100 MeV and 820 GeV**," Astrophys. J. **799** (2015) 1, 86, arXiv:1410.3696 [astro-ph.HE].

[62] M. Ackermann *et al.* [The Fermi LAT Collaboration], '**Limits on Dark Matter Annihilation Signals from the Fermi LAT 4-year Measurement of the Isotropic Gamma-Ray Background**," JCAP **1509** (2015) 09, 008, arXiv:1501.05464 [astro-ph.CO].

Conference proceedings

[63] A. Cuoco, J. Heisig, M. Korsmeier and M. Krämer, "**A combined dark matter study of AMS-02 antiprotons and Fermi-LAT gamma rays**," PoS(EPS-HEP2017)065 [arXiv:1711.06460 [astro-ph.HE]].

[64] H.-S. Zechlin, A. Cuoco, F. Donato, N. Fornengo and M. Regis, "**Statistical measurement of the gamma-ray source-count distribution as a function of energy**," AIP Conf. Proc. **1792**, no. 1, 070020 (2017) arXiv:1702.06319 [astro-ph.HE].

[65] G. A. Gomez-Vargas, A. Cuoco, T. Linden *et al.* [for the Fermi-LAT Collaboration], "**Dark matter implications of Fermi-LAT measurement of anisotropies in the diffuse gamma-ray background**," Nucl. Instrum. Meth. A **742** (2014) 149.

[66] G. Zaharijas, A. Cuoco, Z. Yang, J.Conrad [for the Fermi-LAT Collaboration], "**Fermi-LAT measurement of the diffuse gamma-ray emission and constraints on the Galactic Dark Matter signal**," Nucl. Phys. Proc. Suppl. **239-240** (2013) 88

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[68] A. Cuoco, "**Dark matter multi-wavelength constraints from synchrotron and inverse compton radiation**," Nucl. Instrum. Meth. A **630** (2011) 74.

[69] G. Zaharijas, A. Cuoco, Z. Yang, J.Conrad [for the Fermi-LAT Collaboration], "**Constraints on the Galactic Halo Dark Matter from Fermi-LAT Diffuse Measurements**," PoS IDM **2010** (2011) 111, arXiv:1012.0588 [astro-ph.HE].

[70] A. Cuoco, "**Cosmic gamma-ray background anisotropies and dark matter annihilation**," PoS IDM **2008** (2008) 114.

[71] E. Borriello, A. Cuoco and G. Miele, "**Radio Signal by Galactic Dark Matter**," Nucl. Phys. Proc. Suppl. **190** (2009) 185, arXiv:0812.2932 [astro-ph].

[72] A. Cuoco, "**Cosmological large scale anisotropies in the high-energy cosmic rays and gamma-ray sky**," Nucl. Phys. Proc. Suppl. **168** (2007) 280.

[73] A. Cuoco, "**The signature of local cosmic structures on the ultrahigh energy cosmic ray anisotropies**," Nucl. Phys. Proc. Suppl. **165** (2007) 264, astro-ph/0609577.

Outreach

– A. Cuoco, M. Krämer and M. Korsmeier,
"**Novel dark matter constraints from antiprotons in the light of AMS-02**,"
Phys. Rev. Lett. **118**, no. 19, 191102 (2017),
featured as PRL synopsis: "Antiprotons May Hold Dark Matter Signal"
https://physics.aps.org/synopsis-for/10.1103/PhysRevLett.118.191102

– H. S. Zechlin, A. Cuoco, F. Donato, N. Fornengo and M. Regis,
" **Statistical Measurement of the Gamma-ray Source-count Distribution as a Function of Energy**," Astrophys. J. **826**, no. 2, L31 (2016),
featured on various popular science media in Italy:
http://home.infn.it/it/comunicazione/news/1930-svelate-20-000-nuove-sorgenti-di-raggi-gamma-nel-cielo
http://www.asimmetrie.it/index.php/archivio-news/620-svelate-20-000-nuove-sorgenti-di-raggi-gamma
http://www.media.inaf.it/2016/07/26/sorgenti-gamma-fermi-lat-20000/
http://www.asi.it/it/news/ventimila-sorgenti-gamma-per-fermi
http://www.ansa.it/scienza/notizie/rubriche/spazioastro/2016/07/27/si-allarga-il-catalogo-delluniverso-
cfe3d39e-925b-435a-8016-03de82662d43.html

– M. Regis, J. Q. Xia, A. Cuoco, E. Branchini, N. Fornengo and M. Viel,
"**Particle dark matter searches outside the Local neighborhood**,"
Phys. Rev. Lett. **114** (2015) 24, 241301,
featured on various popular science media in Italy:
http://www.media.inaf.it/2015/05/22/dark-matter-fermi-lat/
http://home.infn.it/it/comunicazione/news/1498-materia-oscura-possibili-tracce-nella-radiazione-elettro
http://www.ilfattoquotidiano.it/2015/06/17/materia-oscura-possibile-connessione-con-radiazioni-elettrom
1787733/

Conferences

- CRIS 2006: Cosmic Ray International Seminar: Ultra-High Energy Cosmic Rays: Status and Perspectives, Catania, Italy, 29 May - 2 Jun 2006, contributed with a talk
- SciNeGHE06: Science with the New Generation High Energy Gamma-ray, Isola d'Elba, Italy, 20-22 Jun 2006, attended
- NOW 2006: Neutrino Oscillation Workshop, Otranto, Lecce, Italy, 9-16 Sep 2006, contributed with a talk
- 3rd ILIAS/N6-ENTApP meeting, Institut d'Astrophysique de Paris (IAP), Paris, France, December 12 - 14, 2006, contributed with a talk
- ICRC 2007, 30th International Cosmic Ray Conference, Merida, Yucatan, Mexico, 3-11 Jul 2007, contributed with a talk

- SciNeGHE07: Science with the New Generation High Energy Gamma-ray, Frascati, Rome, Italy, 18-20 Jun 2007, contributed with a talk
- Nordic Cosmology Workshop 2008, Oslo, March 10-11, 2008, contributed with a talk
- XXth Rencontres De Blois, 18th - 23rd May 2008, contributed with a talk
- IDM2008 - identification of dark matter 2008, Stockholm, August 18-22, 2008, contributed with a talk
- DESY Theory Workshop, Dark Matter at the Crossroads, Hamburg, Sept. 29 - Oct. 2, 2008, contributed with a talk
- TANGO in PARIS, IAP Paris, May. 4 - 6, 2009, contributed with a poster
- RICAP09: Roma International Conference on Astro-Particle Physics, Frascati, Rome, May. 13 - 15, 2009, contributed with a talk
- TeV Particle astrophysics 2009, SLAC, Stanford, July. 13 - 17, 2009, contributed with a talk
- Gamma in Z workshop in Zurich, November 16 -20, 2009, contributed with an invited talk
- Cosmic Ray Backgrounds for DM Searches, Stockholm, January. 25 -27, 2010, contributed with a talk
- Multi3 Workshop, Padua, March. 1 - 4, 2010, contributed with an invited talk
- Dark Matter: Its Origin, Nature and Prospects for Detection, Galileo Galilei Institute, Arcetri, Florence, May 1-23, 2010. A period of 3 weeks (May 1-23) spent at the workshop.
- Anisotropy Workshop, Columbus, OHIO, June. 23, 2010, contributed with an invited talk
- IDM2010 (Identification of Dark Matter), Montpellier, July 30, 2010, contributed with a talk
- 3rd International Fermi Symposium, Rome, May 9-12, 2011, contributed with a poster
- PROSPECTS, PRObems in Statistical Parameter Estimation and ConsTraints for Supersymmetry, Stockholm, September 15-17, 2011, attended
- TeVPA2011, Stockholm, August 1-5, 2011, contributed with a talk
- COSMO2011, Porto, Portugal, August 20-26, 2011, contributed with a talk

- Clusters of Galaxies as Cosmic Laboratories, Stockholm, September 12-14, 2011, attended
- 13th ICATTP (International Conference on Astroparticle, Particle, Space Physics and Detectors for Physics Applications), Villa Olmo, Como, Italy, October 2011. Contributed with an invited Plenary Review talk on: "*Photons (and neutrinos) from DM: status and perspectives*."
- TOOLS for SUSY and New Physics 2012, Stockholm, June 18-21, 2012, attended
- MG13 Thirteenth Marcel Grossmann Meeting, Stockholm, July 1-7, 2012, attended
- IDM2012 (Identification of Dark Matter), Chicago, July 23-27, 2012, contributed with a talk
- Workshop on Recent Developments in Astronuclear and Astroparticle Physics, Trieste, November 19-23, 2012, attended
- 4th Workshop on Air Shower Detection at High Altitude, Napoli, January 30-31, 2013, contributed with a plenary talk on review of Fermi-LAT science and results.
- Workshop on Hunting for Dark Matter: Building a cross-disciplinary, multi-pronged approach, Santa Barbara, California, 29 april-20 may 2013, attended for 3 weeks
- RICAP2013, Roma, 21-26 maggio 2013, contributed with a talk.
- Dark Matter in Galaxies, the LHC and Direct and Indirect Searches: Are We Near the End of the Road?, Aspen, Colorado, 4-16 september 2013, workshop attended for two weeks
- Anisotropy Workshop, Amsterdam 24-28 september 2013, contributed with an invited talk.
- Workshop on the Future of Dark Matter Astro-Particle Physics, Trieste 08-10 oct. 2013 contributed with an invited talk.
- DSU, Dark Side of Universe, Trieste,10-18 october 2013, attended
- What is the Dark Matter?, Stockholm, Sweden, 18-24 may 2014, contributed with a talk.
- Astroparticle Physics 2014, Amsterdam, Netherlands, 23-28 june 2014, contributed with an invited talk.
- Identification of Dark Matter with a Cross-Disciplinary Approach, Madrid, 02-08 may 2015, contributed with an invited talk.

- International Conference on Topics in Astroparticle and Underground Physics (TAUP), Torino, 07-11 sept. 2015, contributed with an invited talk.
- 2nd Anisotropic Universe Workshop, Amsterdam, 11-13 April 2016, contributed with an invited talk.
- Workshop on Perspectives on the Extragalactic Frontier: from Astrophysics to Fundamental Physics, Trieste, 2-6 May 2016, contributed with an invited talk.
- TeV Particle Astrophysics 2016, Cern, Geneva, 12-16 sept. 2016, contributed with an invited talk.
- Very High Energy Phenomena in the Universe, 52th Recontres de Moriond, La Thuile, Valle D'Aosta, Italy, 18-25 March 2017, contributed with an invited talk.
- XSCRC2017: Cross sections for Cosmic Rays @ CERN, Geneva, 29-31 March 2017, attended.
- South American Dark Matter Workshop, Sao Paulo, Brazil, 10-12 May 2017, contributed with an invited talk.
- Perspectives in Astroparticle physics from High Energy Neutrinos, Naples, Italy, 25-26 Sept. 2017, attended.
- Desy Theory Workshop, Hamburg, 26-29 Sept. 2017, contributed with a talk.
- 7th International Fermi Symposium, Garmisch-Partenkirchen, Germany, 15-20 Oct. 2017, contributed with an invited talk.
- 2th Barolo AstroParticle Meeting (BAM), Barolo, Italy, 2-5 Sept. 2018, contributed with an invited talk.

Invited Seminars/Colloquia at Universities and Institutes

- *June 2005* Seminar at the Institute of Corpuscular Physics (IFIC), Valencia
- *May 2006* Astroparticle and Cosmology Group Seminar at the University of Aarhus, Denmark
- *August 2006* Astroparticle Group Seminar at the MPI fur Physik, Munich
- *July 2007* Seminar at the Institute of Corpuscular Physics (IFIC), Valencia
- *August 2007* Astroparticle Group Seminar at the MPI fur Physik, Munich
- *February 2008* Particle Group Seminar at the Norwegian University of Science and Technology (NTNU), Trondheim, Norway

- *January 2009* DESY Theory Colloquium at DESY, Hamburg
- *May 2010* Physics department Colloquium at the University of Bari, Italy
- *July 2010* Astrophysics group Colloquium at the University of Roma 3, Italy
- *May 2011* Theory group Seminar at Saclay, CEA, Paris
- *May 2011* Seminar at IAP (Institut d'Astrophysique de Paris), Paris
- *January 2012* Astroparticle group Seminar at DESY, Hamburg
- *June 2012* Theory group Seminar at the University of Torino, Italy
- *June 2012* Theory group Seminar at the ICTP, Trieste, Italy
- *July 2012* Astroparticle group Seminar at Desy, Zeuthen, Berlin
- *December 2012*, Seminar at the Laboratori INFN, Area di Ricerca, Opicina, Trieste, Italy.
- *January 2013*, Seminar at the ASI (Agenzia Spaziale Italiana) data center, Frascati, Roma.
- *July 2013*, Seminar at the Cahill Center for Astronomy and Astrophysics, Caltech, Pasadena, Los Angeles, California.
- *October 2013*, Seminar at the IFT (Instituto de Fisica Teorica of Madrid)
- *November 2013*, Seminar at the ULB (Université Libre de Bruxelles).
- *July 2014*, Seminar at the Università di Roma 3.
- *May 2015*, Seminar at the Gravitation and AstroParticle Physic Institute (Grappa), Amsterdam, Netherlands.
- *June 2015*, Seminar at the RWTH, Physics Institute, Aachen, Germany.
- *March 2016*, Seminar at the Center for Cosmology, Particle Physics and Phenomenology (CP3) of the University of Louvain-la-Neuve, Belgium.
- *December 2016*, Seminar at the Radboud University, Nijmegen, The Nederlands.
- *January 2017*, Seminar at the University of Oslo, Norway.
- *January 2017*, Seminar at the theory division of Cern, Geneva.
- *May 2017*, Seminar at the Pontificia Universidade Catolica, Rio de Janeiro, Brazil.
- *May 2017*, Seminar at the Instituto de Fisica de Sao Carlos (IFSC), Sao Carlos, Brazil.

- *May 2017*, Seminar at the Instituto de Fisica Teorica, Universidad Estadual Paulista (IFT-UNESP), Sao Paulo, Brazil.
- *June 2017*, Seminar at the University of Padua, Italy.
- *June 2018*, Seminar at the University of Torino, Italy.
- *October 2018*, Seminar at LAPTh, Annecy, France.
- *November 2018*, Seminar at the University of Trento, Italy.

Teaching Portfolio

Alessandro Cuoco

1 Experience

1.1 Courses Taught

While PhD student at the University of Naples I taught a mechanics and thermodynamics course for first year undergraduate students at the faculty of medicine, for the classes of obstetrics/orthopaedics. The number of students was around 40 (about 20 for obstetrics and 20 for orthopaedics) The goal of the course was to present the physics concepts at a basic level, providing the students with the instruments to afford simple problems related e.g. to the blood circulation in the human body, the energy balance in the metabolism or the amount of stress in the bones under various circumstances. The course consisted of a total of 20h divided into 10 lessons 2h each (10 x 2h).

During my postdoc at the Aarhus University I had the possibility to teach the exercise part of the Cosmology course for third year undergraduate students, whose theory part was being taught by prof. S.Hannestad. The course and exercises were based on the book of Barbara Ryden, "Introduction to Cosmology". There were about 20 students following the exercise course and each meeting had a 3 hours duration organized into two distinct moments. In the first hour the students were forced to try to solve the problems by themselves while I was available for clarifications, suggestions or hints. After that, in the second part I was solving the problems on the blackboard. Also, in order to encourage participation to the subject, more often than not one of students was asked to come to the blackboard to either illustrate his/her solution, or, otherwise, to work out the solution with my help. In total, the exercise course consisted of 24h (8 lessons 3h each) of teaching. Besides the scheduled course time, I was also often having further meetings with the students with discussions and explanations both on theory and exercises.

More recently, I lectured a PhD course on the subject "Astrophysical signals of particle dark matter", at the Doctoral School in Physics and Astrophysics of Torino University, academic year 2014-2015. The course consisted of 20h subdivided in 10 classes of 2h each and there were about 10 students. I discussed the various Dark Matter gravitational evidences and the means to investigate the DM particle nature through indirect signals in gamma rays, neutrinos and charged cosmic rays. The course was mainly on theory although for each topic exercises were presented and solved together with the students, like, for example, solutions of the cosmic-ray diffusion equation in some simplified form or calculations of the expected gamma-ray DM signal from some specific target. The final examination consisted of a written relation on an assigned topic.

The period in Aachen is being very intense from the teaching and tutoring point of view. I have been in charge of the exercise class of the Astroparticle course for Master students

during the second semester of the 2015-2016 academic year. The course was attended by 25 students. The organization of the class required a considerable commitment from the tutor side (myself). The core of my duty was, of course, the weekly exercise class itself lasting 2h for the 13 weeks of the semester. The class was devoted to the exercises correction. This was partly performed by the students themselves called at the board and partly by myself, typically for the more demanding exercises. The exercise sheet was provided to the students two weeks in advance of the correction, and they were required to hand-in to me the solutions the following week. My main complementary duty was then to review and grade the exercises of each student during the week, before the final correction in the class. The grades were used at the end of the course to apply some (weak, 50%) threshold for the access to the final exam. Finally, the last duty was to prepare the exercise themselves. Sometimes the exercises were taken from the previous year sheets and slightly modified, while other times I had to think about new exercises based on the arguments of the main lectures (basic topics of the course were galactic and extragalactic cosmic rays, neutrinos and gamma rays). Students had the possibility to evaluate the exercise tutor toward the end of the course. I include in the portfolio the summary of the outcome of the evaluation. During the course I also replaced the professor in charge of the lectures (Prof. Thomas Bretz) for two lectures (2h+2h) on Dark Matter gravitational evidences, direct detection and indirect detection.

In the first semester of the 2016-2017 academic year, similarly, I tutored the exercise class of the Statistical Mechanic course for 3rd-yr bachelor students. The structure and duties for the class are similar to the Astroparticle course above.

In the first semester of the 2017-2018 academic year, I tutored the exercise class of the General relativity and Cosmology course for Master students, attended by 55 students. The structure and duties for the class are similar to the Astroparticle course above. I include in the portfolio the summary of the outcome of the evaluation by the students.

1.2 Experience as Tutor and Supervisor

During my undergraduate and PhD studies in Naples I provided tutoring to several beginning engineering and medicine students while they were preparing their examinations in physics. I also supervised several high school students, typically during the preparation for their final examination in mathematics and physics (italian "maturità") at the end of the fifth year of high school studies.

While postdoc I co-supervised (together with prof. G. Miele) the activity and the Thesis of **Enrico Borriello** during his PhD in Naples. I closely followed his work on Dark matter signatures in the radio and gamma-rays, which became the subject of his PhD thesis. The study eventually resulted in two peer reviewed publications. Enrico then successfully defended his PhD Thesis entitled 'Radio constraints on dark matter annihilation' in January 2009. He is at the moment postdoc in Phoenix, Arizona.

At the moment in Aachen I am supervising Master and Bachelor students. **Samuel Brieden** has completed his BSc thesis on "Analytical propagation of anti-protons in the Galaxy". I asked him to implement in a code the analytical solutions of the diffusion

equation for anti-protons with the aim of using this fast analytical code in replacement of more computationally demanding already existing codes like Galprop. He has defended his Thesis at the end of August 2016.

Jan Burger has worked on his Master Thesis on "Dark Matter Constraints from the intensity and anisotropy of the cosmological gamma-ray background". I have supervised him on this work where information on the Cosmological Gamma-ray Background intensity, anisotropy and cross-correlation with large scale structures are all joined together to best constrain the astrophysical contributions, as well as the possible imprint of DM. He has defended his thesis at the end of October 2016, and he is now a PhD student in Reykjavik.

Michael Korsmeier has worked on his Master Thesis on "New results on cosmic-rays and Dark Matter from a fit of AMS-02 observations". The goal of his work was to use to new precise AMS-02 data to constrain the propagation of cosmic-rays in the Galaxy, and to search for hints or constrain DM looking at anti-protons. We had two publications from his work: *M. Korsmeier and A. Cuoco, "Galactic cosmic-ray propagation in the light of AMS-02: I. Analysis of protons, helium, and antiprotons," arXiv:1607.06093 [astro-ph.HE], Phys.Rev. D94 (2016) no.12, 123019* and *A. Cuoco, M. Krämer and M. Korsmeier, "Novel dark matter constraints from antiprotons in the light of AMS-02," arXiv:1610.03071 [astro-ph.HE] , Phys.Rev.Lett. 118 (2017) no.19, 191102*. Michael defended his thesis on September 2016. Shortly after he started his PhD in Turin. We keep working together, and at the moment we have two further publications together (see the publication list).

In 2017 I supervised Master student **Benjamin Stöltzner** on a thesis on "Dark energy constraints from correlations between gamma rays and cosmic microwave background". Benjamin defended his thesis in October 2017. From the work of his thesis we have a paper together *B. Stölzner, A. Cuoco, J. Lesgourgues and M. Bilicki, "An Updated Tomographic Analysis of the Integrated Sachs-Wolfe Effect and implications for Dark Energy',arXiv:1710.03238 [astro-ph.CO], PRD (2018)* and another one in preparation.

In summer 2017 I supervised bachelor student **Niklas Becker** for his BSc thesis "An Optimized Numerical Calculation of the Extra-Galactic Gamma-Ray Intensity and Anisotropy", where he developed a fast c++ code to calculate intensity and anisotropy in gamma rays. He defended his thesis in September 2017.

Finally, I have supervised master student **Paul Djatschenko** on the subject of "Using gamma-ray intensity and anisotropy to constrain Dark Matter models". Paul defended his thesis on September 2018.

Date	Place
April 25, 2019	Aachen