

Dr. Miguel A. Sánchez-Conde

Contact Information

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Research Interests

Gamma-ray dark matter searches, axions, diffuse γ -ray backgrounds, particle astrophysics, CDM halos, halo substructure, N-body cosmological simulations, Large Scale Structure

Present status

Talento Fellow, Universidad Autónoma de Madrid, Mar 2017 – Feb 2021.
Member of the **Fermi-LAT** Collaboration since September 2011.
Member of the **Cherenkov Telescope Array (CTA)** Consortium since January 2011.

Past research

Wenner-Gren Fellow, Oskar Klein Centre, Stockholm University, Sep 2014 - Feb 2016.
Postdoc at KIPAC/SLAC National Lab, Stanford University, USA, Sep 2011 - Aug 2014.
Postdoc at the Instituto de Astrofísica de Canarias, Spain, Dec 2009 - Aug 2011.
Science coordinator of Fermi-LAT Dark Matter & New Physics WG, Feb 14 - Mar 16.
Former member of the **MAGIC** Cherenkov telescope Collaboration (2007-2010).

Education

- **Ph.D., Astrophysics, October 2009**
Instituto de Astrofísica de Andalucía (IAA/CSIC) and Universidad de Granada, Spain
- **M.Sc., Astrophysics, September 2006**
Instituto de Astrofísica de Andalucía (IAA/CSIC) and Universidad de Granada, Spain
- **B.Sc., Physics, June 2004**
Universidad de La Laguna, Spain

Publications in refereed journals

89 refereed publications with a total of **6192** citations. **h-index: 41** (24-March-17; ADS).
1. *Characterization of subhalo structural properties and implications for dark matter annihilation signals*
A. Moliné, **M. A. Sánchez-Conde**, et al., 2017, MNRAS, accepted, arXiv:1603.04057

2. *Fermi Large Area Telescope as a Galactic Supernovae Axionscope*
M. Meyer, M. Giannotti, A. Mirizzi, J. Conrad, **M.A. Sánchez-Conde**, 2017, PRL, 118, 1103
3. *Dwarf spheroidal J-factors without priors: A likelihood-based analysis for indirect dark matter searches*
A. Chiappo, J. Cohen-Tanugi, J. Conrad, L. Strigari, B. Anderson, **M.A. Sánchez-Conde**, 2017, MNRAS, 466, 669
4. *Searching for Dark Matter Annihilation in Recently Discovered Milky Way Satellites with Fermi-LAT*
A. Albert, B. Anderson; K. Bechtol, A. Drlica-Wagner, M. Meyer, **M.A. Sánchez-Conde**, et al., 2017, ApJ, 834, 110
5. *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*
M. Fornasa M., A. Cuoco, J. Zavala, J. Gaskins, **M. A. Sánchez-Conde**, et al., 2016, PRD, 94, 123005
6. *3FGL Demographics Outside the Galactic Plane using Supervised Machine Learning: Pulsar and Dark Matter Subhalo Interpretations*
N. Mirabal et al., (including **M. A. Sánchez-Conde**), 2016, ApJ, 825, 69
7. *Sensitivity Projections for Dark Matter Searches with the Fermi Large Area Telescope*
E. Charles, **M. A. Sánchez-Conde**, et al. (the Fermi-LAT collab.), 2016, Physics Reports, 636, 1
8. *Search for Spectral Irregularities due to Photon-Axionlike-Particle Oscillations with the Fermi Large Area Telescope*
M. Ajello et al. (the Fermi-LAT collab., **M. A. Sánchez-Conde** corresponding author), 2016, PRL, 116, 161101
9. *Limits to dark matter annihilation cross-section from a combined analysis of MAGIC and Fermi-LAT observations of dwarf satellite galaxies*
A. Ahnen et al., (including **M. A. Sánchez-Conde**), 2016, JCAP, 02, 039
10. *Search for Gamma-Ray Lines towards Galaxy Clusters with the Fermi-LAT*
B. Anderson et al., (including **M. A. Sánchez-Conde**), 2016, JCAP, 02, 026
11. *Search for extended gamma-ray emission from the Virgo galaxy cluster with Fermi-LAT*
M. Ackermann et al., (including **M. A. Sánchez-Conde**), 2015, ApJ, 812, 159
12. *The nature of the Diffuse Gamma-Ray Background*
M. Fornasa and **M. A. Sánchez-Conde**, 2015, Physics Reports, 598, 1
13. *Limits on Dark Matter Annihilation Signals from the Fermi LAT 4-year Measurement of the Isotropic Gamma-Ray Background*
M. Ackermann et al. (the Fermi-LAT collab., **M. A. Sánchez-Conde** corresponding author), 2015, JCAP, 09, 008

14. *Search for Gamma-Ray Emission from DES Dwarf Spheroidal Galaxy Candidates with Fermi-LAT Data*
A. Drlica-Wagner, et al., the Fermi-LAT and DES collaborations, 2015, ApJL, 809, 4
15. *The Origin of the Extragalactic Gamma-Ray Background and Implications for Dark-Matter Annihilation*
M. Ajello, D. Gasparri, **M. A. Sánchez-Conde** et al., 2015, ApJL, 800, 27
16. *The flattening of the concentration-mass relation towards low halo masses and its implications for the annihilation signal boost*
M. A. Sánchez-Conde and F. Prada, 2014, MNRAS, 442, 2271
17. *Constraints on WIMP Annihilation for Contracted Dark Matter in the Inner Galaxy with the Fermi-LAT*
G. A. Gomez-Vargas, **M. A. Sánchez-Conde**, J. Huh, et al. 2013, JCAP, 10, 029
18. *Dark Matter and Fundamental Physics with the Cherenkov Telescope Array*
M. Doro, J. Conrad, D. Emmanoulopoulos, **M. A. Sánchez-Conde**, et al. 2013, ApP, 43, 189
19. *Characterization of Dark-Matter-induced anisotropies in the diffuse γ -ray background*
M. Fornasa, J. Zavala, **M. A. Sánchez-Conde**, et al. 2012, MNRAS, 429, 1529
20. *Dark matter searches with Cherenkov telescopes: nearby dwarf galaxies or local galaxy clusters?*
M. A. Sánchez-Conde, M. Cannoni, F. Zandanel, M. Gómez and F. Prada, 2011, JCAP, 12, 011
21. *Axion-like particle imprint in cosmological very high energy sources*
A. Domínguez, **M. A. Sánchez-Conde** and F. Prada, 2011, JCAP, 11, 020
22. *Dark Matter decay and annihilation in the Local Universe: CLUES from Fermi*
A. J. Cuesta, T. Jeltema, F. Zandanel, S. Profumo, F. Prada, G. Yepes, A. Klypin, Y. Hoffman, S. Gottloeber, J. Primack, **M. A. Sánchez-Conde**, C. Pfrommer, 2010, ApJL, 726, L6
23. *Impact of Internal Bremsstrahlung on the detection of gamma-rays from neutralinos*
M. Cannoni, M. Gómez, **M. A. Sánchez-Conde**, F. Prada and O. Panella, 2010, Phys. Rev. D, 81, 107303
24. *MAGIC Gamma-ray Telescope Observation of the Perseus Cluster of Galaxies: Implications for Cosmic Rays, Dark Matter, and NGC 1275*
J. Aleksic, et al. (including **M. A. Sánchez-Conde**), 2010, ApJ, 710, 634
25. *Hints of the existence of Axion-Like-Particles from the gamma-ray spectra of cosmological sources*
M. A. Sánchez-Conde, D. Paneque, E. Bloom, F. Prada and A. Domínguez, 2009, Phys. Rev. D, 79, 123511
26. *Upper limits on the VHE gamma-ray emission from the Willman 1 satellite galaxy with the MAGIC telescope*
E. Aliu, et al. (corresponding author **M. A. Sánchez-Conde**), 2009, ApJ, 697, 1299

27. *Upper limit for gamma-ray emission above 140 GeV from the dwarf spheroidal galaxy Draco*
J. Albert, et al. (including **M. A. Sánchez-Conde**), 2008, ApJ, 679, 428
28. *Dark Matter Annihilation in Draco: new considerations of the expected gamma flux*
M. A. Sánchez-Conde, F. Prada, E. W. Lokas, M. E. Gómez, R. Wojtak and M. Moles, 2007, Phys. Rev. D, 76, 123509
29. *The spherical collapse model with shell crossing*
M. A. Sánchez-Conde, J. Betancort-Rijo and F. Prada, 2007, MNRAS, 378, 339
30. *Detailed theoretical predictions of the outskirts of dark matter halos*
J. E. Betancort-Rijo, **M. A. Sánchez-Conde**, F. Prada and S. G. Patiri, 2006, ApJ, 649, 579
31. *How far do they go? The outer structure of dark matter halos*
F. Prada, A.A. Klypin, E. Simonneau, J. Betancort-Rijo, S. G. Patiri, S. Gottlöber and **M. A. Sánchez-Conde**, 2006, ApJ, 645, 1001

19 more refereed publications as a member of the Fermi-LAT Collaboration

2 more refereed publications as a member of the CTA Consortium

31 more refereed publications as a former member of the MAGIC Collaboration

6 more refereed contributions to conference proceedings.

Contributions to Conferences

23 invited oral participations:

1. *The search for cosmological annihilation signals with the Fermi LAT*
Dark matter from aeV to ZeV, Durham, UK, November 2016
2. *Indirect detection, simulations and data*
Dark Matter in the Milky Way, Mainz, Germany, May 2016
3. *Indirect dark matter searches circa 2016. A brief review.*
April APS meeting, Salt Lake City, USA, April 2016
4. *Characterization of subhalo structural properties and implications for dark matter annihilation signals*
2nd anisotropic universe, GRAPPA, Amsterdam, The Netherlands, April 2016
5. *The battlegrounds of gamma-ray detection of dark matter: the Galactic center and dwarf galaxies*
19th annual International Conference on Particle Physics and Cosmology (COSMO 15), Warsaw, Poland, September 2015
6. *Recent results on indirect dark matter searches*
XXVII Symposium on Lepton-Photon interactions at High Energies, Ljubljana, Slovenia, August 2015

7. *The future of indirect dark matter searches*
Weak Interactions and Neutrinos (WIN) 2015, Heidelberg, Germany, June 2015
8. *Limits on dark matter annihilation from the Fermi-LAT 4-yr measurement of the Isotropic Gamma-ray Background*
Identification of Dark Matter with a Cross-Disciplinary Approach, IFT-UAM/CSIC, Madrid, Spain, May 2015
9. *The hunt for axion-like particles with gamma rays*
Off-the-Beaten-Track Dark Matter and Astrophysical Probes of Fundamental Physics, ICTP-Trieste, Italy, April 2015
10. *Recent results from the Fermi gamma-ray space telescope*
42 SLAC Summer Institute, SLAC National Lab, Menlo Park, CA, USA, August 2014
11. *Cosmological dark matter annihilation signals: theoretical predictions*
HEM 2014, Chicago, USA, June 2014
12. *The flattening of the concentration-mass relation towards low halo masses and its implications for the annihilation signal boost*
UCLA Dark Matter 2014, Los Angeles, CA, USA, February 2014
13. *Cold dark matter halo concentrations and substructure annihilation boosts*
What can we learn from the gamma-ray sky? workshop, Minneapolis, MN, USA, October 2013
14. *Dark matter constraints from the Fermi/LAT extragalactic gamma-ray background and the role of halo substructure*
220 AAS meeting, Anchorage, AK, USA, June 2012
15. *ALP gamma-ray searches with Fermi and Cherenkov telescopes*
Vistas in Axion physics: A Roadmap for Theoretical and Experimental Axion Physics through 2025, University of Washington, Seattle, WA, USA, April 2012
16. *The Fermi/LAT Extragalactic Diffuse Background and its dark matter interpretation*
UCLA Dark Matter 2012, Marina del Rey, CA, USA, February 2012
17. *The axion challenge in gamma-rays: a blueprint of the best search strategy*
3rd Rome International Conference on Astroparticle Physics, Rome, Italy, May 2011
18. *Looking into the dark: the fingerprint of neutralinos and axions in gamma-rays*
TeVPA10 Conference, Paris, France, July 2010
19. *Axions in gamma-rays: a blueprint of the best search strategy*
Multicube workshop, Padova, Italy, March 2010
20. *Gamma-ray searches of neutralino annihilations in the Milky Way*
Theoretical miniworkshop on Dark Matters, Madrid, Spain, September 2009
21. *The search of axion-like-particles with Fermi and Cherenkov telescopes*
Theoretical miniworkshop on Dark Matters, Madrid, Spain, September 2009
22. *Gamma-ray dark matter searches in the Milky Way*
Distribution of Mass in the Milky Way Conference, Leiden, Netherlands, July 2009

23. *Dark Matter searches with Cherenkov telescopes: a brief review*
High Energy phenomena in Galaxy Clusters and Dark Matter searches Workshop,
Granada, Spain, February 2009

17 more **oral contributions** and 11 **posters**.

Selected (10) colloquia and seminars

- *Search for gamma rays in dwarf galaxies with the Fermi LAT* [**invited**]
SuperCDMS science seminar, April 2015
- *Recent results of dark matter searches with the Fermi-LAT* [**invited**]
IFT seminar, Instituto de Física Teórica, UAM/CSIC, Madrid, Spain, December 2014
- *Cold dark matter halo substructure and its role in γ -ray dark matter searches* [**invited**]
GRAPPA seminar, GRAPPA Institute, Amsterdam, Netherlands, March 2014
- *Dark matter halo substructure and its role in γ -ray dark matter searches* [**invited**]
High Energy Physics seminar, Columbia University, NY, USA, October 2013
- *Dark matter halo substructure and its role in γ -ray dark matter searches* [**invited**]
TAPIR seminar, CalTech, Pasadena, USA, June 2013
- *Looking into the dark: the present status of γ -ray dark matter searches*
IFIC seminar, IFIC/CSIC, Valencia, Spain, April 2013
- *Current status of gamma-ray dark matter searches with Fermi*
Instituto de Física de Altas Energías, Universidad Autónoma de Barcelona, Spain,
November 2012
- *Dark matter annihilation: nearby dwarf galaxies or local galaxy clusters?*
KIPAC Tea Talk, KIPAC/SLAC, Stanford, Menlo Park, USA, December 2011
- *The signature of Axions in the spectra of VHE sources*
GLAST Lunch seminar, KIPAC/SLAC, Stanford, Menlo Park, USA, April 2008
- *Dark matter in Draco: new considerations of the expected gamma flux*
Nicolaus Copernicus Astronomical Center, Warsaw, Poland, November 2006

Selected teaching experience

- Lecturer: *Advanced Problem Solving* undergraduate course, Stockholm University,
Spring 2016, 2017
- Lecturer: *Astroparticles* master course, Universidad Autónoma de Madrid, Spring
2015, 2017
- Invited lecturer: *HAP workshop 2014 on data analysis for indirect dark matter searches*,
E Shrodinger Zentrum, Berlin, Germany, March 2014
- Coach at the *Workshop on dark matter tools and Fermi science tools*, IFIC/CSIC,
Valencia, Spain, April 2013
- Co-supervisor of Qi Zeng (Stanford graduate student), October 2012 – April 2013.
Project title: *DM subhalos and unidentified Fermi sources*.

Other relevant activities

- **Scientific Coordinator** of the Dark Matter and New Physics working group of the **Fermi LAT** Collaboration between February 2014 and March 2016.
- Current **Coordinator** of the γ -rays and cosmic-rays dark matter detection working group of the **MultiDark** Spanish project. Since January 2010.
- **Convener** of the Dark Matter Working Group at the Oskar Klein Centre for Cosmoparticle Physics, Stockholm University, Nov 2015 – Feb 2017.
- **Convener** of the **indirect dark matter searches session of the TeVPA16** international conference, CERN, September 2016.
- Member of the Oskar Klein Centre **colloquium committee** since September 2015.
- **Co-organizer** of the **Fermi lunch seminars**, KIPAC/SLAC, 2012-2014.
- **Co-organizer** of the *School on Dark Matter tools and Fermi Science Tools*, IFIC, Valencia, Spain, April 2013.
- **Co-organizer** of the *School on Fermi Science Tools for Multidarkians*, Universidad Autónoma de Madrid, Spain, April 2010.
- **LOC** member of the *Cosmology across cultures* international conference, Granada, Spain, September 2008.
- **Panelist** for the Spanish National Agency for Evaluation and Prospective (ANEP).
- **Referee** for JCAP, PRL, PRD, MNRAS, Computer Physics Communications.
- **Panelist** for the NASA Fermi Guest Investigator Program Peer Review.

Selected Outreach Activities

- "The gamma-ray sky" outreach talk at *Forskarfredag*, Stockholm University, Sweden, September 2016.
- "Dark Matters" outreach talk at *Fysikalisk afton*, Stockholm University, April 2015.
- Science referee at the *Green Kids conference*, science fair organized by Microsoft in the Bay Area, CA, USA, May 2014.
- *Google Hangout on Dark Matter: "Cazadores de materia oscura"*, event organized by MultiDark, *Materia* online journal and the IFT-UAM/CSIC. February 2014.
- Speaker of the *Dark Matter Awareness Week*, IAC, Spain, December 2010
- *Nuestra visión actual del Universo: la Cosmología del siglo XXI*, Invited talk at the University of Extremadura, Badajoz, Spain, November 2009
- *Dark-energy particle spotted*, **Nature News**, May 29th, 2009
- Regular collaborator of **Radio Aguerre**, Tenerife, Spain, 2010-2011
- Regular collaborator of the **Museo de la Ciencia y el Cosmos de Tenerife** in organizing outreach activities for the general public in 2002-2003 and 2011.
- Several outreach **talks for students**, University of Extremadura, High Secondary and Primary Schools, campings, Southwestern Spain, 1996-present