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Daniel Morcuende

May 12, 2021

PhD student in Astrophysics. Study of VHE γ-ray emission from AGNs. Monte Carlo simulations of fluorescence light emitted in extensive air showers.

Education

Oct 2017 - Now **PhD in Astrophysics**, *Universidad Complutense de Madrid*, Madrid, Spain.

Oct 2016 - Oct 2017 **MS in Astrophysics**, *Universidad Complutense de Madrid*, Madrid, Spain.
Master's Thesis: *A Monte Carlo study of the relevance of fluorescence radiation in VHE gamma ray observations with Cherenkov telescopes.*

2011 - 2016 **BS in Fundamental Physics**, *Universidad Complutense de Madrid*, Madrid, Spain.

Professional experience

Apr 2018 - Now **PhD candidate**, *Universidad Complutense de Madrid*, High Energy Astrophysics with MAGIC, VERITAS and CTA.
Supervisors: J. Rosado, J.L. Contreras.
Funding: *Universidad Complutense de Madrid*, Spanish Ministry of Economy and Competitiveness.

Sep 2017 - Apr 2018 **Research Assistant in the High Energy Physics Group**, *Universidad Complutense de Madrid*, Proving convolutional neural nets for event reconstruction in γ-ray Astronomy with CTA. Participation in the definition of the LST1 (CTA - Large Size Telescope Prototype) data format (DL-0).
Supervisors: D. Nieto, J.L. Contreras.
Funding: Spanish Ministry of Economy and Competitiveness.

Jul–Sep 2017 **Summer Internship – H.E.S.S. Group**, *DESY*, Zeuthen, Germany.
Early design implementation of a monitoring system for the calibration coefficients of the recent upgraded H.E.S.S.-I cameras involving database management with MySQL. Study of the new system's stability.
Supervisors: S. Bonnefoy, S. Klepser, S. Ohm.
Funding: Deutsches Elektronen-Synchrotron (DESY), Helmholtz Association.

Sep 2016 - Jul 2017 **Research Assistant in the High Energy Physics Group**, *Universidad Complutense de Madrid*, Implementation of atmospheric fluorescence emission in the CORSIKA Monte Carlo framework.
Supervisors: J.L. Contreras, J. Rosado, F. Arqueros
Funding: Spanish Ministry of Economy and Competitiveness.

Conference contributions

Apr 2021 **D. Morcuende**, *Processing LST-1 data with LSTOSA*, LST Collaboration General Meeting, Online. Oral contribution.

Nov 2020 **D. Morcuende**, J. Rosado, *ShowerModel: A Python package for modeling cosmic-ray induced air showers, their light production and detection*, ADASS XXX, Online. Oral contribution.

Nov 2020 J. E. Ruiz, **D. Morcuende**, L. Saha, A. Baquero, J.L. Contreras, and I. Aguado, *LSTOSA: On-site processing pipeline for the CTA Large Size Telescope prototype*, ADASS XXX, Online. Oral contribution.

Ene 2020 D. Dominis Prester, **D. Morcuende**, S. Ventura, G. Bonnoli, E. Lindfors, *BL Lacertae flare in May 2019*, AGN meeting of the MAGIC Collaboration, Barcelona, España. Oral contribution.

Ene 2020 D. Dominis Prester, **D. Morcuende**, S. Ventura, G. Bonnoli, E. Lindfors, *BL Lacertae flare in May 2019*, AGN meeting of the MAGIC Collaboration, Barcelona, España. Oral contribution.

Jul 2019 **D. Morcuende**, M. Nievas Rosillo, J.L. Contreras, L. Saha, *The role of a fast On-Site analysis in the study of very-high-energy AGN activity*, V Spanish Meeting of AGN Research in Spain, Santander, España. Oral contribution.

Mar 2019 **D. Morcuende**, *Simulation of fluorescence radiation for Cherenkov observatories*, The New Era of Multi-Messenger Astrophysics Symposium. Oral contribution.

Dec 2018 **D. Morcuende**, *Very-high-energy Astrophysics: The relevance of fluorescence radiation in Cherenkov telescopes and the γ-ray emission from blazars*, Jornadas de Doctorado en Astrofísica. Oral contribution.

Dec 2018 D. Morcuende, *The relevance of fluorescence radiation in Cherenkov telescopes*, PhDay Physics. Poster contribution.

Jul 2018 F. Arqueros, J. Rosado, **D. Morcuende**, J.L. Contreras, *The relevance of fluorescence radiation in Cherenkov telescopes*, 26^{th} Extended European Cosmic Ray Symposium and 35^{th} Russian Cosmic Ray Conference. Oral contribution. DOI: 10.1088/1742-6596/1181/1/012047 `arXiv:1810.01689`

Jul 2017 **D. Morcuende**, J. Rosado, J.L. Contreras, F. Arqueros et al., *A Monte Carlo study of the relevance of fluorescence radiation in VHE gamma ray observations with Cherenkov telescopes*, 35^{th} International Cosmic Ray Conference, Bexco/Busan, Korea. Oral contribution (Speaker: F. Arqueros). `PoS(ICRC2017)839`

Grants and Fellowships

Mar 2018 Predoctoral grant UCM-Harvard University (CT17/17–CT18/17), awarded by *Universidad Complutense de Madrid*.

2016–2017 Master's Excellence Scholarship for postgraduates studies at *Universidad Complutense de Madrid*.

2013–2014 SÉNECA student exchange program at *Universidad de Cantabria*.

Memberships

2016 Member of the Cherenkov Telescope Array (CTA) Consortium

2017 Member of the Major Atmospheric Gamma Imaging Cherenkov (MAGIC) Collaboration

2017 Member of the Institute of Particle and Cosmos Physics (IPARCOS), UCM

2018 Member of Large Size Telescope (LST) Collaboration

Publications

- V. Acciari et al. [The MAGIC Collaboration], *Monitoring of the radio galaxy M 87 during a low emission state from 2012 to 2015 with MAGIC*, MNRAS, Advance Access. DOI: 10.1093/mnras/staa014
- V. Acciari et al. [The MAGIC Collaboration], *Testing emission models on the extreme blazar 2WHSP J073326.7+515354 detected at very high energies with the MAGIC telescopes*, MNRAS, Vol. 490, Issue 2, p.2284-2299. DOI: 10.1093/mnras/stz2725
- V. Acciari et al. [The MAGIC Collaboration], *Observation of inverse Compton emission from a long -ray burst*, Nature, 575(7783), pp. 455-458. DOI: 10.1038/s41586-019-1754-6
- V. Acciari et al. [The MAGIC Collaboration], *Teraelectronvolt emission from the -ray burst GRB 190114C*, Nature, 575(7783), pp. 459-463. DOI: 10.1038/s41586-019-1750-x
- V. Acciari et al. [The MAGIC Collaboration], *Constraints on Gamma-Ray and Neutrino Emission from NGC 1068 with the MAGIC Telescopes*, ApJ, 883(2),135 (2019). DOI: 10.3847/1538-4357/ab3a51
- J. McEnery et al. *All-sky Medium Energy Gamma-ray Observatory: Exploring the Extreme Multimessenger Universe*, Astro2020: Decadal Survey on Astronomy and Astrophysics, APC white papers, no. 245; Bulletin of the American Astronomical Society, Vol. 51, Issue 7, id. 245 (2019).
- A. Acharyya, et al. [CTA Consortium], *Monte Carlo studies for the optimisation of the Cherenkov Telescope Array layout*, Astropart. Phys., 111, pp. 35-53. DOI: 10.1016/j.astropartphys.2019.04.001
- V. Acciari et al. [The MAGIC Collaboration], *Measurement of the extragalactic background light using MAGIC and Fermi-LAT gamma-ray observations of blazars up to $z = 1$*, MNRAS, 486(3), pp. 4233-4251. DOI:10.1093/mnras/stz943
- D. Morcuende, J. Rosado, J.L. Contreras, F. Arqueros, *Relevance of the fluorescence radiation in VHE gamma-ray observations with the Cherenkov technique*, Astropart. Phys. 107 (2019) 26-34, DOI: 10.1016/j.astropartphys.2018.11.003

- The CTA Consortium, *Science with the Cherenkov Telescope Array*, 2017, DOI:10.1142/10986

Academic Experience

2019-2020 Laboratory of *Thermodynamics*, undergraduate Physics program at UCM

2018-2019 Laboratory of *Atomic and Molecular Physics*, undergraduate Physics program at UCM

2019-2020 Laboratory of *Atomic and Molecular Physics*, undergraduate Physics program at UCM

Extra-curricular activities

Nov 2018 **First Machine Learning CTA workshop**, *Universidad Complutense de Madrid*, Spain.

Sep 2018 **Operator at MAGIC telescopes**, ORM, La Palma, Spain.

Jun 2018 **MAGIC software school**, ORM, La Palma, Spain.

Jun 2018 **Advanced software programming for astrophysics and astroparticle physics**, *Second Asterics-Obelics International School*, LAPP, Annecy, France.

Dec 2017 **Research methodologies and the doctoral process in the field of Science and Engineering**, *Doctoral School (EDUCM)*, *Universidad Complutense de Madrid*.

Jul–Sep 2017 **DESY Summer Student Program**, *Zeuthen*, Germany.

Jul 2017 **Japan and Europe Network for Neutrino and Intensity Frontier Experimental Research, JENNIFER I Summer School on Particle Physics and Detectors**, *Grünberg*, Germany.
Funding: Deutsches Elektronen-Synchrotron DESY (Helmholtz Association)

Languages

Spanish **Native Speaker**

English **Upper-intermediate** *good working knowledge*

Computer skills

OS Unix/Linux, MS Windows

Languages Python, FORTRAN, Shell scripting, R, basics of C++

Databases MySQL

Algorithms CORSIKA (Cosmic Ray Simulations for Kascade), `sim_telarray`

Tools Vim, git, LaTeX, gdb, perf/gproof, Inkscape

Other experience

Nov 2015 - 2018 **Organizer and speaker at Madrid Science Week**, *Universidad Complutense de Madrid*, "Tracking cosmic ray muons using a Spark Chamber" and "Cosmic or gamma ray? Challenge the Artificial Intelligence".

Miscellanea

Sep 2011 Car driving license

Jun 2018 Basic First Aid (CPR) Course by the Spanish Red Cross