David G. Cerdeño

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Contact

Personal data
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Research Fields

Astroparticle Physics
Theory and Phenomenology or Dark Matter models.

Direct Dark Matter detection
Member of the SuperCDMS Collaboration.

Particle Physics Phenomenology
Supersymmetry and String Theory phenomenology.

Positions Held

2014-Now	**Lecturer**	IPPP, Durham University
2009-2014	**Ramón y Cajal Fellow (Tenure track)**	IFT, Universidad Autónoma de Madrid
2006-2009	**Juan de la Cierva Fellow**	IFT, Universidad Autónoma de Madrid
2004-2006	**Research Associate**	IPPP, Durham University
2003-2004	**Postdoctoral Researcher**	Hamburg Universität
2002-2003	**Postdoctoral Researcher**	Martin-Luther Universität Halle-Wittenberg

Qualifications

2016 **Fellow of the Higher Education Accademy** HEA

22 Oct. 2012 **Senior Lecturer Spanish Accreditation** ANECA
Awarded by the National Agency for Quality Assessment and Accreditation of Spain.

25 Jul. 2002 **Ph.D. in Physics** Universidad Autónoma de Madrid
"Phenomenological analyses in supersymmetric scenarios, superstrings and M-theory". Supervisor: Prof. Carlos Muñoz.

Sep. 200 **M.Sc. in Physics** Universidad Autónoma de Madrid
"Phenomenology of non-standard embedding and five-branes in M-theory". Supervisor: Prof. Carlos Muñoz.

Jun. 1998 **Degree in Physics** Universidad Autónoma de Madrid

Teaching

Postgraduate Courses

2014-2016 **Astroparticle Physics** — Durham University
Lecturer. 2 courses, 8 hours each

2013-2016 **Astroparticle Physics** — Universidad Autónoma de Madrid
Lecturer and course coordinator. 3 courses, 10 hours each

2009-2012 **Beyond the Standard Model** — Universidad Autónoma de Madrid
Lecturer and course coordinator. 3 courses, 10 hours each

Apr. 2009 **Dark matter and its direct detection** — Max-Planck-Institut für Physik, München
Block Course by invitation at the Max-Planck-Institut für Physik (Werner-Heisenberg-Institut) Mn̈chen, Germany, 6-9 April, 2009. (8 hours).

Undergraduate Courses

2014-2016 **Mathematics Workshop: Integral Transforms (PHYS3591)** — Durham University
Lecturer. 2 courses, 16 hours each

2014-2016 **Physics Problem Solving: Computing Projects (PHYS3561)** — Durham University
Lecturer. 2 courses, 16 hours each

2007-2014 **Mathematical Methods in Physics II** — Universidad Autónoma de Madrid
Lecturer and course coordinator. 7 courses, 60 hours each

2012-2014 **Experimental detection of dark matter: the SuperCDMS experiment** — Universidad Autónoma de Madrid
Lecturer and course coordinator. 2 courses, 60 hours each

204-2006 **Level 1 General Physics** — Durham University
Tutor. 2 courses, 38 hours each

Physics Schools

2015-2016 **HEP Summer School** — Lancaster University
Lecturer for the course "Astroparticle Physics: Dark Matter and Neutrinos" (2 courses, 5 hours each) and tutor.

2014-2015 **Taller de Altas Energías (TAE)** — Centro de Física Pedro Pascual, Benasque
Lecturer for the course "Dark Matter" (2 courses, 5 hours each) and tutor.

2008 **Taller de Altas Energías (TAE)** — Universidad Autónoma de Madrid
Tutor.

2005-2006 **BUSTEPP**
Tutor at the 35^{th} and 36^{th} "British Universities Summer School in Theoretical Elementary Particle Physics" (BUSSTEPP 2005 in Ambleside and 2006 in Edinburgh).

Student Supervision

PhD

Ongoing **Andrew Cheek** Durham University

Ongoing **Víctor Martín** Universidad Autónoma de Madrid
Co-supervised with J.Moreno. Completion expected in December 2016

Jul. 2014 **Miguel Peiró** Universidad Autónoma de Madrid
"A complementary approach for the identification of dark matter"

MSc

Oct. 2016 **Marina Peñalver** Durham University
"Background characterization in SuperCDMS"

Oct. 2016 **Pablo Martín** Durham University
"Phenomenology of the NMSSM at the LHC"

Jul. 2016 **Elena Perdomo** Universidad Autónoma de Madrid
"How high is the neutrino floor in dark matter direct detection experiments?"

Oct. 2015 **Elias Gerstmayr** Durham University
"Direct Detection of Dark Matter: Annual Modulation in EFT operators"

Oct. 2015 **Isabel Pennock** Durham University
"Studying the neutrino coherent scattering with direct dark matter experiments"

Oct. 2013 **Leyre Esteban** Universidad Autónoma de Madrid
"Study of the background from cosmogenic muons in SuperCDMS"

Oct. 2013 **Sandra Robles** Universidad Autónoma de Madrid
"Phenomenology of the RH sneutrino in the NMSSM"

Oct. 2012 **Víctor Martín** Universidad Autónoma de Madrid
"Displaced Vertices in the NMSSM with Right-Handed Neutrino"

Oct. 2010 **Miguel Peiró** Universidad Autónoma de Madrid
"Very light sneutrino dark matter in the NMSSM"

Jun. 2006 **Tom Varley** Durham University
"Particle Dark Matter" (Co-supervised with A. Dedes).

BSc

Jun. 2015 **Elias Gerstmayr** Universidad Autónoma de Madrid
"Effective field theory approach and annual modulation"

Jun. 2013 **Cristina Marcos Martín** Universidad Autónoma de Madrid
"Direct detection of dark matter"

Projects

2013-2018 **String Phenomenology in the LHC Era** RC-2012-ADG-20120216-32042
ERC Advanced Grant SPLE (PI: Luis Ibáñez).

2012-2015 **Astroparticles in the Universe** FPA2012-34694
Supported by the Spanish MICINN (PI: Carlos Muñoz).

2012 **Supersymmetric Dark Matter** AIC-D-2011-0771
Cooperation between UAM and Torino University, supported by the Spanish MICINN (PI: David G. Cerdeño).

2009-2014 **Proyecto de Investigación Ramón y Cajal** 1001050044
Supported by the Spanish MICINN (PI: David G. Cerdeño).

2009-2014 **Consolider-Ingenio 2010: MultiDark** CSD2009-00064
Supported by the Spanish MICINN. (PI: Carlos Muñoz).

2009-2014 **HEPHACOS** S2009/ESP-1473
Supported by the Community of Madrid. (PI: Luis Ibáñez)

2009-2012 **Astroparticles in the Universe** FPA2009-08958
Supported by the Spanish MICINN. (PI: Carlos Muñoz).

2008-2009 **Supersymmetric Dark Matter** FPA2008-04058-E/INFN
Cooperation between UAM and Torino University, supported by the Spanish DGI of the MEC and the Italian INFN. (PI: Carlos Muñoz).

2006-2009 **Astroparticles in the Universe: Dark Matter, Neutrinos, and Cosmic Rays** FPA 2006-01105
Supported by the DGI of the Spanish Ministry of Science and Education (MEC) (PI: Gustavo Yepes).

2006-2007 **Direct and Indirect Detection of Dark Matter in Supersymmetry and Superstrings** HF-2005-0005
Acción Integrada Hispano-Francesa between UAM and CNRS (LPT-Orsay), supported by the Spanish DGI of the MEC and the French EGIDE of the Ministry of Foreign Affairs (PI: Carlos Muñoz).

2007-2008 **Susy Dark Matter** INFN07-31, CICYT-INFN 2007
Cooperation between UAM and Torino University, supported by the Spanish DGI of the MEC and the Italian INFN (PI: Carlos Muñoz).

2006-2010 **UniverseNet** MRTN-CT-2006-035863
Research Training Network.

2004-2009 **European Network for Theoretical Astroparticle Physics (ENTApP)** RII-CT-2004-506222
Part of the Integrated Large Infrastructures for Astroparticle Science **(ILIAS)**, through the University of Durham.

2004-2008 **The Quest for Unification: Theory confronts experiment** MRTN-CT-2004-503369
Research Training Network.

2003-2004 **Acción Integrada Hispano-Alemana** HA2002-0117
Through the DAAD (Deutscher Akademischer Austausch Dienst).

2003-2004 **Deutsche Forschungsgemeinschaft (DFG) Schwerpunktprogramm (1096)** DFG LO 536/5-2
Stringtheorie im Kontext von Teilchenphysik, Quantenfeldtheorie, Quantengravitation, Kosmologie und Mathematik.

2000-2004 **RTN European Program** HPRN-CT-2000-00148
Through the Halle-Hamburg Universities sub-node.

2000-2003 **Física de Partículas: El modelo estándar y más allá** FPA2000-0980
Supported by the Spanish CICYT. At the Department of Theoretical Physics of the Universidad Autónoma de Madrid.

1998-2000 **Física de Altas Energías: El modelo estándar y más allá** AEN97-1678
Supported by the Spanish CICYT. At the Department of Theoretical Physics of the Universidad Autónoma de Madrid.

Event Organisation

Conferences

2016 **3rd Dark Matter from aeV to ZeV: IBS-IPPP-MultiDark workshop** IPPP, Durham University
(21-25 Nov 2016)

2016 Lincoln College, Oxford, UK
(9 Ago 2016)

2015 **Annual Theory Meeting** IPPP, Durham University
(20-22 Dec 2015)

2015 **2nd IBS-MultiDark Workshop on Dark Matter** IFT, Universidad Autónoma de Madrid
(23-27 Nov. 2015)

2014 **IBS-MultiDark Program on Dark Matter and Axions** IBS, Daejeon, Korea
(9-22 Oct. 2014)

2013 **Why $m_H = 126$ GeV?** IFT, Universidad Autónoma de Madrid
25-27 Sep 2013

2010 **1st MultiDark Consolider Workshop** IFT, Universidad Autónoma de Madrid
(25-27 Ene 2010)

2009 **XV Christmas Workshop** IFT, Universidad Autónoma de Madrid
(16-18 Dec 2009)

2009 **miniWorkshop on Dark Matters** IFT, Universidad Autónoma de Madrid
(16 - 18 Sep. 2009)

2005 **SUSY05** IPPP, Durham University
Member of the organising committee (18-23 Jul. 2015).

2005 **pre-SUSY05 Workshop** IPPP, Durham University
One of three main organisers (29 Jun - 15 Jul 2015).

Schools

2017 **YETI20017** IPPP, Durham University
Young Experimentalists and Theorists Institute (Jan 2017).

2008 **ISAPP2008** Miraflores de la Sierra, Madrid
International School on Astroparticle Physics (21 Jun - 1 Jul 2008).

Discussion Sessions

2009-2016 **MultiDark Direct Detection Working Group**
Coordinating the discussion sessions of the Direct Detection Working Group in MultiDark Collaboration Meetings (twice per year).

2005-2008 **ENTApP Visitors program**
“Dark Matter in the unconstrained MSSM, Split Supersymmetry, and the NMSSM” (17 Jan. - 4 Feb. 2005, CERN, Geneva), and “Direct Detection of Dark Matter” (Feb. 2008, DESY Hamburg, Germany).

Seminars

2016-2017 **IPPP, Durham University**
Organiser of the regular seminar programme during the academic year 2016-2017.

2006-2009 **Universidad Autónoma de Madrid**
Member of the organising commitee of the regular seminar programme during the academic years 2006-2009.

2005-2006 **IPPP, Durham University**
Member of the organising commitee of the regular seminar programme during the academic year 2005-2006.

Outreach

2009-2014 **Outreach coordinator** IFT, Universidad Autónoma de Madrid

2010-2014 **Outreach coordinator of the MultiDark Consolider Project**

2010-2014 **Member of the Outreach Commitee for the Physics Degree** Universidad Autónoma de Madrid

2012-2013 **Member of the Outreach Working Group** SuperCDMS Collaboration

I have given over 30 public talks on various topics in Particle and Astroparticle Physics for a general audience. This includes seminars in Science and Arts Museums, contributions to multidisciplinary Masters programs, elaboration of material, etc. I have been the local organiser of activities for High School students (organiser of the “International Masterclass” at the IFT in 2010, 2011, 2012 and 2013). I have also contributed with formative lectures (on elementary aspects of Particle Physics and Cosmology) for High School Teachers in 2011, 2012 and 2013.

Seminars

53 oral presentations in international conferences

Selected list of invited plenary talks:

- "Towards the Identification of Dark Matter". Rencontres de Blois 2015, Blois, France, **31 May -5 June. 2015**
- "Dark Matter Particle Candidates". TAUP 2013, Monterey, USA, **8-13 Sep. 2013**
- "Where is the New Physics II?- Review of latest non-LHC results". International Workshop on Future Linear Colliders, Arlington, USA, **21-26 Oct. 2012**
- "Dark Matter". XXXIX International Meeting on Fundamental Physics, LSC Canfranc, Spain, **8 Feb. 2011**
- "Direct detection of DM. Where do we go?". Dark Matter in the Sky and Underground, University of Zurich, Switzerland, **22-24 Sep. 2010**
- "LHC impact on Dark Matter searches". WONDER 2010 Workshop, INFN Gran Sasso National Laboratory (LNGS), Italy, **22 Mar. 2010**
- "Supersymmetric Dark Matter: Neutralinos and Sneutrinos". VII workshop on Science with the New Generation of High Energy Gamma-ray Experiments (SciNeGHE 2009). Assisi, Italy, **7 Oct. 2009**
- "Direct Detection and Identification of Dark Matter". International Symposium on Cosmology and Particle Astrophysics: CosPA 2008, Pohang, Korea, **1 Nov. 2008**
- "WIMPs: a brief bestiary". 4^{th} Patras Workshop on Axions, WIMPs and WISPs, DESY Hamburg, Germany, **18 Jun. 2008**

39 invited seminars at various universities and research centres

2016: Imperial College (UK)

2015: IFAE (Spain); Swansea (UK); Nottingham (UK);

2014: Granada (Spain); Bonn (Germany);

2013: INFN Torino (Italy); GRAPPA Amsterdam (The Netherlands); DESY Hamburg (Germany), IFT (Spain)

2012: IFIC (Spain); ULB (Belgium); TMU (Munich)

2011: MPIK Heidelberg (Germany); RWTH Aachen (Germany); University of Minnesota (US); IFAE (Spain);

2009: TUM (Germany); IFIC (Spain).

2008: IAP (France); IFT-UAM (Spain); SNU (Korea); KIAS (Korea); KAIST (Korea).

2007: LPT, Orsay (France); CAB-INTA (Spain); IFT-UAM (Spain).

2006: University of Sussex (UK).

2005: Univ. of Oxford (UK); Centre for Particle Physics at Royal Holloway (UK).

2004: Univ. of Lancaster (UK); Univ. of Sheffield (UK); Univ. of Liverpool (UK).

2003: DESY Hamburg (Germany) (3 seminars); IPPP Durham (UK).

2002: Martin-Luther-Universität Halle-Wittenberg (Germany) (2 seminars).

Publications

References

Articles

[1] R. Agnese et al., Projected Sensitivity of the SuperCDMS SNOLAB experiment, arXiv:1610.0000.

[2] M. Bauer et al., Towards the next generation of simplified Dark Matter models, arXiv:1607.0668.

[3] D. G. Cerdeno, M. Fornasa, A. M. Green, and M. Peiro, How to calculate dark matter direct detection exclusion limits that are consistent with gamma rays from annihilation in the Milky Way halo, Phys. Rev. **D94** (2016), no. 4 043516, [arXiv:1605.0518].

[4] D. G. Cerdeno, M. Fornasa, A. M. Green, and M. Peiro, How to calculate dark matter direct detection exclusion limits that are consistent with gamma rays from annihilation in the Milky Way halo, Phys. Rev. **D94** (2016), no. 4 043516, [arXiv:1605.0518].

[5] D. G. Cerde M. Fairbairn, T. Jubb, P. A. N. Machado, A. C. Vincent, and C. B, Physics from solar neutrinos in dark matter direct detection experiments, JHEP **05** (2016) 118, [arXiv:1604.0102]. [Erratum: JHEP09,048(2016)].

[6] **SuperCDMS** Collaboration, R. Agnese et al., New Results from the Search for Low-Mass Weakly Interacting Massive Particles with the CDMS Low Ionization Threshold Experiment, Phys. Rev. Lett. **116** (2016), no. 7 071301, [arXiv:1509.0244].

[7] D. G. Cerdeno, M. Peiro, and S. Robles, Enhanced lines and box-shaped features in the gamma-ray spectrum from annihilating dark matter in the NMSSM, JCAP **1604** (2016), no. 04 011, [arXiv:1507.0897].

[8] D. G. Cerdeno, M. Peiro, and S. Robles, Fits to the Fermi-LAT GeV excess with RH sneutrino dark matter: implications for direct and indirect dark matter searches and the LHC, Phys. Rev. **D91** (2015), no. 12 123530, [arXiv:1501.0129].

[9] L. Aparicio, P. G. Camara, D. G. Cerdeno, L. E. Ibanez, and I. Valenzuela, The NMSSM with F-theory unified boundary conditions, JHEP **02** (2013) 084, [arXiv:1212.4808].

[10] D. G. Cerdeno and C. Munoz, Neutralino dark matter in supergravity theories with non-universal scalar and gaugino masses, JHEP **10** (2004) 015, [hep-ph/0405057].

Proceedings

[11] M. Bauer et al., Towards the next generation of simplified Dark Matter models, arXiv:1607.0668.

[12] D. G. Cerdeno, E. Gabrielli, and C. Munoz, Experimental constraints on the neutralino nucleon cross-section, in Corfu Summer Institute on Elementary Particle Physics (Corfu 2001) Corfu, Greece, August 31-September 20, 2001, 2002. hep-ph/0204271.