

## JOSE M. DIEGO RODRIGUEZ

Instituto de Física de Cantabria  
[jdiego@ifca.unican.es](mailto:jdiego@ifca.unican.es) | 610-909-5947

### EDUCATION

- 2000 **PhD in Physics/Astronomy**, University of Cantabria, Santander, Spain  
PhD thesis, *Data analysis techniques for CMB data and the Sunyaev-Zel'dovich effect*  
1996 **BSc, Physics**, University of Cantabria, Santander, Spain

### POST-DOCS AND FELLOWSHIPS

- 2004-2005 **Massachusetts Institute of Technology (MIT), MA, USA**, Prof. Max Tegmark's group  
2003-2004 **University of Pennsylvania, PA, USA**, Prof. Max Tegmark's group  
2001-2003 **University of Oxford, UK**, Marie Curie European Fellowship, Prof. Joseph Silk's group

### PROFESSIONAL EXPERIENCE

- 2010-2013 **Director of the [Observatorio Astronómico de Cantabria \(OAC\)](#)**, Outreach facility of the Regional Government of Cantabria, Spain.  
2009-present **Permanent Staff CSIC Researcher (Tenure)**, Consejo Superior de Investigaciones Científicas (CSIC), Spain, [Instituto de Física de Cantabria](#), Santander, Spain  
2005-2009 **Researcher, Ramón y Cajal Contract (Tenure-Track)**, Consejo Superior de Investigaciones Científicas (CSIC), Spain, [Instituto de Física de Cantabria](#), Santander, Spain

### RESEARCH INTERESTS

Dark matter, cosmology and galaxy clusters from a multiwavelength perspective (*gravitational lensing, Sunyaev-Zel'dovich, X-ray*). The Planck mission (*I'm a Planck scientist and a LFI core team member*). Large surveys (J-PAS survey). Cosmological N-body simulations (*I am a member of the Jubilee simulation consortium*)

### PhD THESIS ADVISOR

- 2007-2011 Pier Paolo Ponente received his PhD with the maximum score. He published three papers as the main author on topics related to free-free radiation from the early universe, the radio background, and gravitational lensing.  
2014-2015 Jose M. Dana. Master Thesis research project (International University of Valencia). He obtained the highest qualification among his peers for his work (galaxy cluster simulations with self-annihilating dark matter particles)

### UNIVERSITY CLASS TEACHING EXPERIENCE (Responsible for creating and teaching some classes in these programs)

- 1999 **General Relativity**, University of Cantabria (UC), Santander, Spain  
2005-2012 **PhD Cosmology Program**, University of Cantabria, Santander, Spain  
2007-2012 **Master Programs**, UC Physics and UC Physical Technologies & Computation, Santander, Spain

### UNDERGRAD STUDENT SUPERVISION

- 2002 Supervised PhD student's research (*Veronika Sliwa*) during his visit to the University of Oxford, UK  
2010 Directed student's summer research program (*Antonio Cuenca*) using data from the OAC  
2011 Supervised & directed student research project (*Ilargi Zaballa*). University of Cantabria  
2013 Supervised and directed the research project of a student (*Daniel Bilbao*). University of Cantabria  
2015 Supervised and directed a research project of a Harvard student (*Shayn Lozano*) during his summer student-exchange program at University of Cantabria

### CONFERENCE ORGANIZATION

- 2016 **Dark Matter 2016. From the smallest to the largest scales.** Main organizer. LOC and SOC chairs.  
2015 **CosmoCruise2015. At the edge of discovery.** Main organizer. LOC and SOC chairs.  
2013 **EPI2013, Exploring the Physics of Inflation**, Member of LOC  
2011 **SZ2011, Sunyaev-Zel'dovich 2011**, Main organizer, LOC and SOC chairs  
2008 **SEA2008, Ann. Mtg. of the Spanish Astronomy. Soc.**, 2008, Member of LOC, Proceedings Editor  
2007 **DAC2007, Data Analysis in Cosmology, 2007**, Member of LOC

### BOOKS/EDITOR

- Co-editor, **Highlights of Spanish Astrophysics V: Astrophysics and Space Science Proceedings**  
ISBN 978-3-642-11249-2. Springer-Verlag Berlin Heidelberg, 2010 (*Proceedings of the SEA2008 conference*)

Member of the Editorial board of the *SEA boletin*, for the Spanish Society of Astronomy

*Referee in astronomy journals; Astronomy and Astrophysics, Monthly Notices of the Royal Astronomical Society.*

#### **PRESENT PARTICIPATION IN LARGE COLLABORATIONS**

**Planck Scientist / LFI Core Team member**, The Planck Mission (<http://www.rssd.esa.int/index.php?project=Planck>), is a satellite that surveys the entire sky at 9 frequencies between 30 GHz and 857 GHz. I have direct access to the latest calibrated data and participate in the scientific exploitation of the data (*particularly in the galaxy cluster group*). Lead some subprojects in galaxy cluster science within the Planck collaboration. I was responsible for one of the papers in the 2013 Planck release and contributed significantly to other papers. I am currently leading two official Planck papers.

**J-PAS survey** (<http://j-pas.org/>) an international collaboration that is building a telescope to make deep observations of the sky over 8000 square degrees and with more than 56 bands. The wide sky coverage combined with the large number of bands will allow the determination of photometric redshifts with unprecedented precision, and to study the Baryonic Acoustic Oscillations (BAO) in great detail. In this collaboration, I am mostly involved in the creation of the large N-body simulations, cosmological studies with galaxy clusters and the synergies that emerge when combining J-PAS data and Planck data. I am in charge of the Simulation Group within J-PAS.

#### **GRANTS AND AWARDS** (*Most recent and/or relevant*)

1996-2000 **FPI Grant (PhD grant)**, Funded by the Ministry of Education (Spain)

2001-2003 **Marie Curie Fellowship (postdoc grant)**, Funded by the European Union (*Oxford University*)

2006 **Title:** Cosmology from a joint Planck-SALT galaxy cluster in southern sky (**PI: Jose M. Diego**)  
**Funded by:** Spanish and South African governments  
**Duration:** 2 years  
**Amount:** 16,000 EUR (*Spanish side, a similar amount was granted to the SA group*)

2006 **Title:** Multifrequency study of galaxy clusters, (**PI: Jose M. Diego**)  
**Funded by:** Spanish government  
**Duration:** 1 year  
**Amount:** 10,000 EUR

2007 **Title:** CMB, science with the Planck satellite and development of new polarization experiments  
**Funded by:** Spanish government  
**Duration:** 3 years  
**Amount:** 510,620 EUR

2010 **Title:** Exploring the physics of inflation (EPI)  
**Funded by:** Spanish government  
**Duration:** 5 years  
**Amount:** 4 Million EUR

2013 **Title:** Scientific exploitation of Planck and Herschel data. Readiness for J-PAS and instrumental design of future microwave experiments  
**Funded by:** Spanish government  
**Duration:** 2 years  
**Amount:** 219,960EUR

2015 **Title:** Lighting the Dark. Properties of dark matter through its impact on cosmological structures (**PI: José M. Diego**)  
**Funded by:** Spanish government  
**Duration:** 3 years  
**Amount:** 83,000EUR

2016 **Title:** Free-Form Models for the Six Hubble Frontier Fields Clusters (**PI: Gary Bernstein & José M. Diego**)  
**Funded by:** Hubble Space Telescope  
**Duration:** 16 months  
**Amount:** 99,500 USD

**SELECTED PUBLICATIONS** (*Total: 180+ peer review in prestigious international journals, 16000+ citations, H factor of 55. Full publication list including proceedings can be found on [this webpage](http://www.ifca.unican.es/users/jdiego/) <http://www.ifca.unican.es/users/jdiego/>).*

**REFEREED ARTICLES AS FIRST AUTHOR**

**A Free-Form mass model of the Hubble Frontier Fields Cluster AS1063 (RXC J2248.7-4431) with over one hundred constraints**

Diego et al. 2016, MNRAS, 459, 3447

**A free-form prediction for the reappearance of supernova refsdal in the Hubble Frontier Fields Cluster MACSJ1149.5+2223**

Diego et al. 2016, MNRAS, 456, 356

**Planck intermediate results. XL. The Sunyaev-Zeldovich signal from the Virgo cluster**

Planck Collaboration. 2016, A&A accepted, arXiv:1511.05156 **(I lead this paper)**

**Hubble Frontier Field Free-Form Mass Mapping of the Massive Multiple-Merging Cluster MACSJ0717.5+3745**

Diego et al., 2015, MNRAS, 451, 3920

**The orthogonally aligned dark halo of an edge-on galaxy in the Hubble Frontier Fields: A challenge for modified gravity.**

Diego et al., 2015, MNRAS, 449, 588

**Free-form lensing implications for the collision of dark matter and gas in the Frontier Fields cluster MACSJ0416.1-2403.**

Diego et al., 2015, MNRAS, 447, 3130

**A free-form lensing grid solution for A1689 with new multiple images,**

Diego et al. 2015, MNRAS, 446, 683

**Planck Intermediate Results: VIII. Filaments between interacting clusters **(I lead this paper)****

Planck Collaboration: 2013, A&A, 550, 134

**An anomalous Wilkinson Microwave Anisotropy Probe signal in the ecliptic plane,**

Diego et al. 2010, MNRAS, 402, 1213

**The Sunyaev-Zel'dovich effect in Wilkinson Microwave Anisotropy Probe data,**

Diego & Patridge 2010, MNRAS, 402, 1179

**Looking for the Sunyaev-Zel'dovich effect in the Virgo cluster from WMAP and ROSAT data,**

Diego & Ascasibar 2008, MNRAS, 389, 1805

**Observing high-redshift galaxy clusters through lensing of the Ostriker-Vishniac effect,**

Diego & Herranz 2008, MNRAS, 383, 791

**Combined reconstruction of weak and strong lensing data with WSLAP,**

Diego et al. 2007, MNRAS, 375, 958

**Non-parametric mass reconstruction of A1689 from strong lensing data with the Strong Lensing Analysis Package (SLAP),** Diego et al. 2005, MNRAS, 362, 1247

**Non-parametric inversion of strong lensing systems,**

Diego et al. 2005, MNRAS, 360, 477

**The hybrid SZ power spectrum: combining cluster counts and SZ fluctuations to probe gas physics,**

Diego & Majumdar, 2004, MNRAS, 352, 993

**The Sunyaev-Zel'dovich effect contribution to WMAP: a cross-correlation between WMAP and ROSAT,**

Diego, Silk & Sliwa, 2003, MNRAS, 346, 940

**Kinetic Sunyaev-Zel'dovich Effect and Cosmic Microwave Background Polarization from Subsonic Bulk Motions of Dense Gas Clouds in Galaxy Cluster Cores,**

Diego, Mazzotta & Silk. 2003, ApJ, 597, 1

**Cosmological constraints from the cluster contribution to the power spectrum of the soft X-ray background. New evidence for a low  $\sigma_8$ ?** Diego et al. 2003, MNRAS, 344, 951

**Morphological redshift estimates for galaxy clusters in a Sunyaev-Zel'dovich effect survey,** Diego et al. 2003, MNRAS, 341, 599

**The impact of relativistic corrections and component separation in the measurement of the Sunyaev-Zel'dovich effect and on the small angular scale non-Gaussianity of the cosmic microwave background,** Diego et al. 2003, MNRAS, 338, 796

**A Bayesian non-parametric method to detect clusters in Planck data,** Diego et al. 2002, MNRAS, 336, 1351

**The Sunyaev-Zel'dovich effect as a cosmological discriminator,** Diego et al. 2002, MNRAS, 331, 556

**Constraining our Universe with X-ray and optical cluster data,** Diego et al. 2001, MNRAS, 325, 1533

**Partition function based analysis of cosmic microwave background maps,** Diego et al. 1999, MNRAS, 306, 427

#### OTHER RELEVANT REFEREED ARTICLES WITH SIGNIFICANT PARTICIPATION (*Most recent and relevant*)

**'Refsdal' meets Popper: comparing predictions of the re-appearance of the multiply imaged supernova behind MACS1149.5+2223**

Treu, T.; Brammer, G.; **Diego, J. M.** et al. 2015, preprint arxiv 151005750

**Young Galaxy Candidates in the Hubble Frontier Fields. II. MACS, J0416-2403**

Infante L., Zheng W., Laporte N., Troncoso P., Molino A., **Diego J. M.** et al. 2015, ApJ, 815, 18

**Self-similarity and universality of void density profiles in simulation and SDSS data**

Nadathur S., Hotchkiss S., **Diego J.M.**, et al. 2105, MNRAS, 449, 3997

**A rigorous free-form lens model of Abell 2744 to meet the Hubble Frontier Fields Challenge.**

Lam D., Broadhurst T., , **Diego J.M.**, et al (4 more authors), 2014, ApJ, 797, 98

**The Jubilee ISW project I: simulated ISW and weak lensing maps and initial power spectra results**

Watson W, **Diego J.M.**, et al (12 more authors), 2014, MNRAS, 438, 412

**Enabling Non-parametric strong lensing to derive reliable cluster mass distributions. WSLAP+**

Sendra, I., **Diego J.M.**, Broadhurst, T., Lazkoz, R. 2014, MNRAS, 437, 2642

**Planck 2015 results. XXIV. Cosmology from Sunyaev-Zeldovich cluster counts**

Planck Collaboration. 2015, preprint, arxiv 150201597

**Planck 2013 Results. XVI. Cosmological Parameters**

Planck Collaboration. 2014, A&A, 571, 16

**A Geometrically Supported  $z \sim 10$  Candidate Multiply Imaged by the Hubble Frontier Fields Cluster A2744**

Zitrin et al. 2014, ApJ, 793, 12

**Planck 2013 Results. XXIX. Planck catalogue of Sunyaev-Zeldovich sources**

Planck Collaboration. 2014, A&A, 571, 29

**Planck 2013 Results. XIX. The Integrated Sachs-Wolfe effect**

Planck Collaboration. 2014, 571, 19

**Planck 2013 Results. XXI. Cosmology with the all-sky Planck Compton parameter  $y$ -map**

Planck Collaboration. 2013 accepted for publication in A&A, arxiv:1303.5081

**Planck 2013 Results. XX. Cosmology from Sunyaev-Zeldovich cluster counts**

Planck Collaboration. 2014, A&A, 571, 20

**Planck Intermediate Results: X. Physics of the hot gas in the Coma cluster**

Planck Collaboration. 2013, A&A, 554, 140

**Planck Intermediate Results: V. Pressure profiles of galaxy clusters from the Sunyaev-Zeldovich effect**

Planck Collaboration. 2013, A&A, 550, 131

**Planck Early Results: VIII. The all-sky early Sunyaev-Zeldovich cluster sample**

Planck Collaboration. 2011, A&A, 536, 8P

**Planck Early Results: VII. The Early Release Compact Source Catalogue**

Planck Collaboration. 2011, A&A, 536, 7P

**Filtering techniques for the detection of Sunyaev-Zel'dovich clusters in multifrequency maps**

Herranz D., Sanz JL., Hobson M.P., Barreiro R.B.; **Diego, J.M.**, et al. 2002, MNRAS, 336, 1057

**The CMB cold spot: texture, cluster or void?**

Cruz, M.; Martínez-González, E.; Vielva, P.; **Diego, J.M.**; Hobson, M.; Turok, N. 2008, MNRAS, 390, 913

**On the formation of cold fronts in massive mergers**

Mathis, H.; Lavaux, G.; **Diego, J.M.**; Silk, J. 2005, MNRAS, 357, 801

**The case for non-Gaussianity on cluster scales**

Mathis, H.; **Diego, J.M.**; Silk, J. 2004, MNRAS, 353, 681

**SELECTED PRESENTATIONS AT CONFERENCES** (*Most recent and relevant*)

(*Total: 20+ talks at international meetings and conferences*)

- 2015 **Dark Matter in galaxy clusters from lensing**, *CosmoCruise Meeting, Mediterranean Sea.*
- 2015 **Dark Matter in the Hubble Frontier Fields**, *SnowCluster Meeting, Snowbird, Utah, USA*
- 2014 **Free Form solutions for the Hubble Frontier Fields**, *Yale Frontier Fields Meeting, New Haven, USA*
- 2014 **Dark Matter in the Hubble Frontier Fields clusters**, *SEA Meeting, Teruel, Spain*
- 2014 **The dark matter distribution in A1689**, *Moriond Cosmology Meeting, Italy*
- 2013 **All sky ISW and Lensing maps in the Jubilee Simulation**, *Meeting in La Cristalera, Madrid*
- 2013 **A large N-body simulation for J-PAS**, *J-PAS Meeting, Valencia*
- 2012 **Planck's view of Galaxy Clusters**, *IAU Meeting in Beijing*
- 2012 **SZ effect in WMAP data**, *Rencontres de Moriond, Italy*
- 2011 **Large Scale Structure: A Microwave Vision** (*Invited talk*), *IXO Meeting in Rome*
- 2006 **Mass reconstruction from combined weak and strong lensing data**, *Rencontres de Moriond, Italy*
- 2004 **Mass reconstruction with Lensing** (*Invited talk*), *Data Analysis in Cosmology, Valencia Summer school*
- 2003 **SZ from cross-correlating WMAP and ROSAT**, *NAM2003 Meeting in Dublin*
- 2003 **Cosmology with the Planck SZ catalog** (*Invited talk*), *SZ meeting in Chicago*
- 2001 **Cosmological constraints from galaxy clusters**, *Mining the Sky meeting in Garching, Germany*

**SELECTED INVITED OUTREACH TALKS**

- 2015 Outreach talk program at High Schools in Cantabria. Cabezón de la Sal HS, *Spain*  
**SUBJECT:** *The Edge of the Universe.*
  
- 2015 Outreach talk program at High Schools in Cantabria. Escalante HS. Laredo, *Spain*  
**SUBJECT:** *History and Structure of the Universe.*
  
- 2014 Opening talk of the program to commemorate the 75<sup>th</sup> anniversary of CISC for students and staff at the University of Cantabria, *Spain*  
**SUBJECT:** *Dark Matter.*
  
- 2014 Public talk for a large audience in an Educational Centre for adults, *Cabezón de la Sal, Spain*  
**SUBJECT:** *To Infinity and Beyond.*
  
- 2013 Public talk for a large audience of High School students, *I.E.S. Muriedas, Spain*  
**SUBJECT:** *Current Advances in Astronomy.*

- 2012 Scientific Coffee for a broad audience in the *Cafe de las Artes, Santander, Spain*  
**SUBJECT:** *The Edge of the Universe* followed by a long debate with questions from the audience.
- 2012 Opening talk to commemorate the 30<sup>th</sup> anniversary of the [Agrupación Astronómica Cántabria](#) in the Cultural Center, Doctor Madrazo, *Santander, Spain*  
**SUBJECT:** *A Very Strange Universe*
- 2011 At the [Rencontres Transfrontalières d'Astronomes Amateurs](#), *Hendaye, France (Invited opening talk)*  
**SUBJECT:** *The Edge of the Universe.*
- 2011 *VII Jornadas nacionales y V internacionales sobre naturaleza y medio ambiente. Santander, Spain.*  
**SUBJECT:** *Light Pollution and its Consequences.*
- 2011 Opening talk for the *Cosmos Origin's (Science Marathon) Program, National Museum of Science and Technology, Madrid, Spain*  
**SUBJECT:** *Cosmic Microwave Background and the Size of the Universe.*
- 2009 For the astronomy summer course, *Curso Práctico de Astronomía: Midiendo el Universo*, organized by the University of Cantabria, *Valderredible, Spain*  
**SUBJECT:** *Galaxy clusters*
- 2006 Opening talk on *XVII Spanish National Meeting of Amateur Astronomers, Santander, Spain.*  
**SUBJECT:** *The Largest Known Objects in the Universe: Galaxy Clusters*

#### **PUBLIC ALGORITHMS/CODES**

**WSLAP+** : A free-form code (Fortran and IDL) for the analysis of gravitational lensing data

**LensExplorer** : A public IDL code to visualize the deflection field from the Hubble Frontier Field program