

Jacobo Asorey

CURRICULUM VITAE

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Research interest:

My research has addressed the determination of the ultimate structure of dark energy. This analysis is based on astronomical observations with extragalactic surveys in different wavelength ranges. Most of my more relevant results paved the way to new methodologies and optimisation techniques that allow us to extract cosmological information from surveys in a faster and more robust way. My most relevant work is my contribution to get the most stringent constraints on cosmological parameters just from using Galaxy Clustering and Weak Lensing, getting confidence levels similar to the ones obtained from Cosmic Microwave Background (CMB). Thanks to this, we have been able to confirm the validity of the cosmological model Λ CDM with great accuracy. In the last years, I started analyzing the data from radio telescopes, being a pioneer in the field of the new era of radio-cosmology, both in radio continuum surveys and in the analysis of the distribution of neutral hydrogen from the birth of the first stars to the present realm of large-scale structure.

My research is developed in the framework of international collaborations, which I joined as a member, such as the photometric Dark Energy Survey (DES), the spectroscopic follow-up, the Australian Dark Energy Survey (OzDES), the spectroscopic Dark Energy Spectroscopic Instrument (DESI) and the photometric narrow-band Physics of the Accelerating Universe Survey (PAUS). In the field of radio-astronomy, I am a prominent member of the Evolutionary Map of the Universe (EMU) radio continuum Survey and I am involved in the SKA Observatory cosmology sub working group. All these collaborations and experiments are playing a central role in the task of understanding the nature of dark energy.

The results of my research can be summarized as

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- Total # of publications: 102 (including white-papers & supernova detections)
 - Total number of Q1 journal publications: 64 (6 as first author)
 - Citations (ADS database): 8700
 - h-index (ADS database): 37
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I have disseminated my results as speaker in more than 40 international conferences, being invited speaker in 20 of them. I also was invited speaker in 15 seminars at Universities of Australia, Korea, Italy, Spain and USA. In some of them, I have represented a whole collaboration such as in the EMU general science meetings and the Rencontres de Moriond 2022. Chosen as the Cosmology lecturer in the Taller de Altas Energías (TAE) International Workshop 2023 and 2024, the international school for all PhD students on High Energy Physics

I became a permanent professor in 2024 at the Department of Theoretical Physics and Centro de Astropartículas y Física de Altas Energías (CAPA) of the Universidad de Zaragoza (Spain). I was distinguished with a María Zambrano Atracción de Talento Internacional contract in the 2021 call, starting in September 2022 at the Universidad Complutense de Madrid (UCM) until August 2024. Previously, I was a postdoctoral researcher at CIEMAT (Spain, 2019-2022), as part of the European Union Horizon 2020 project “Enabling Weak lensing Cosmology”. I started my research career by completing my PhD in 2013 at the Universitat Autònoma de Barcelona, under the supervision of E. Gaztañaga and M. Crocce. My first postdoctoral position was at the University of Illinois at Urbana-Champaign, USA (2013-2016). Afterwards I was appointed as a CAASTRO fellow at the University of Queensland (Australia 2016-2017) and the Centre for Astrophysics

and Supercomputing of the Swinburne University of Technology (Australia, 2017-2018). I also worked as a postdoc at the Korea Astronomy and Space Science Institute, KASI (Korea, 2018-2019). In all these positions, I have been a participant in 7 competitive research projects funded by the main agencies of European Union, Spain, Korea, Australia and the United States.

In addition, I have been involved in the organizing committee of two conferences and two summer schools. I have coordinated meetings of scientific collaborations. I was a member of the postdoctoral committee in CAASTRO. I am a reviewer of Q1 journals: MNRAS and ApJ. I am an evaluator of the Spanish national evaluation agency (ANEP). I have been accredited as I3 distinguish researcher by Ministerio de Universidades and as PCD by the ANECA.

I supervised two master thesis at UCM:

- “Efecto de la estructura a gran escala del Universo en la cosmología con supernovas” Alberto Sánchez Fernández-Pedraza (2022)
- “Cosmología con cartografiados extragalácticos en radiotelescopios” David Fernández Gil (2021)

I also co-supervised the master thesis of Christopher Johnson, at the University of Queensland (2018). I have successfully supervised three bachelor thesis. My former student David Fernández Gil joined Sejong University group in Korea where I participate in his doctoral supervision. I have taught in Bachelor and Master courses for more than 500 hours. I have been member of master thesis panels in the University of Queensland and in a PhD thesis jury in the Universidad Complutense de Madrid. I have participated in several outreach activities in different countries (Spain, Korea and Australia) and different languages.

Education and Academic Degrees

- PhD in Physics at Universitat Autònoma de Barcelona, Spain (UAB) (2013)
Mark: Summa Cum Laude (2013)
- Master on High Energy Physics, Astrophysics and Cosmology at Universitat Autònoma de Barcelona, Spain (2011).
- Licenciado en Física (Physics degree) at Universidad de Zaragoza, Spain (2009), with marks awarded with the García Galdeano prize.

- Diploma of Higher Education (University of Southampton, UK) Academic year: 2008/2009
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Research Positions:

- Profesor Permanente Laboral (Associate Professor), Centro de Astropartículas y Física de Altas Energías (CAPA), Universidad de Zaragoza (September 2024 -)
 - María Zambrano fellow at Departamento de Física Teórica, F. Ciencias Físicas, Universidad Complutense de Madrid (September 2022 - 2024)
 - Postdoctoral Researcher at the Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT) [E. Sánchez] (December 2019 - August 2022)
 - Postdoctoral Fellow at the Centre for Theoretical Astrophysics, Korea Astronomy and Space Science Institute [D. Parkinson] (May 2018 - December 2019)
 - Postdoctoral Research Associate at the Centre for Astrophysics and Supercomputing, Swinburne University of Technology [C. Blake] (August 2017 - February 2018)
 - Postdoctoral Research Fellow at the Department of Physics, University of Queensland [T. Davis] (September 2016 - August 2017)
 - Postdoctoral Scholar at the Department of Physics, University of Illinois at Urbana-Champaign [J. Thaler] (October 2013 - June 2016)
 - Predoctoral Student Institut de Ciències de l'Espai (IEEC-CSIC) [E. Gaztañaga] (October 2009 - September 2013)
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Research Fellowships:

- María Zambrano Atracción de Talento Internacional grant at the Universidad Complutense de Madrid. (2021)

- DES Early Career Award at Munich (2012), Berkeley (2013), Madrid (2015), Cambridge (2016) and Chicago (2017)
- Predoctoral grant JAE-Predoc (CSIC) at Institut de Ciències de l'Espai (IEEC-CSIC) (October 2009 - September 2013).
- Research stay JAE Predoc grant for a stay at the University of Sussex (June 2011) and University College of London (June-July 2012).
- Research summer grant for undergraduate students (JAE-Intro, CSIC) at Instituto de Física Teórica (U. Autónoma de Madrid) (July-September 2008).

Participation in competitive research projects:

- PR3/23-30808, Cosmología con cartografiados extra-galácticos de radio con precursores del Square Kilometre Array Observatory. (2023-2024) 10.460 EUR. Principal Investigator.
- EWC776247, Enabling Weak Lensing Cosmology Horizon 2020. (2018 - 2022). PI: Thomas Kitching. Budget: 1.587.154 EUR.
- KASI, Understanding Dark Universe Using Large Scale Structure of the Universe, PI: Yong-Seon Song. (2015 - 2022). Budget: 6.000.000 \$.
- CE110001020, Australian Research Council Centre of Excellence for All-Sky Astrophysics Australian Research Council Centres of Excellence (2011 - 2018). Budget: 21.000.000 \$
- Department of Energy Project of High Energy Physics at the University of Illinois (DE-SC0009932). Postdoctoral researcher in the group of Jon Thaler (2013 - 2016). Budget: 11.000.000 \$
- Cosmología con cartografiados extragalácticos, Spanish Government Plan Nacional (2009-2012, AYA2009-13936). PI: Enrique Gaztañaga. Budget: 1.300.000 EUR
- CosmoComp-Marie Curie Initial Training Network, European Community (FP7-PEOPLE-ITN-2008-238356) (2009-2012), PI: Carlton Baugh, PI: Enrique Gaztañaga (Spanish Node). Budget: 5.000.000 EUR
- Physics of the Accelerating Universe (PAU) (2009-2013) Participant. Spanish Government Consolider Ingenio 2010 Program (CSD2007-00060). PI: Enrique Fernandez. Budget: 4.700.000 EUR

Participation in large collaborations:

- Dark Energy Spectroscopic Instrument. (2018-). Participant, member of the cross-correlation working group involved in the cross-correlation with radio surveys.
- Australian Square Kilometre Array Pathfinder and Evolutionary Map of the Universe (ASKAP-EMU). (2016-). Member, part of the cosmological analysis team and co-coordinator of the cosmological analysis subgroup
- SKA Observatory (SKAO). (2018-). Associate member, part of the cosmological sub working group.
- Physics of the Acceleration of the Universe survey (PAUS). (2020-). Participant.
- Euclid collaboration. (2020-). Member.
- OzDES. (2016-). Builder, involved in the Supernova group and organizer of regular weekly meetings.
- The Dark Energy Survey (DES). (2010-). Participant, involved in the Large Scale Structure Working Group, Photometric redshifts Working Group, Supernovae and in the Theory and Combined Probes Working Groups.
- The Large Synoptic Survey Telescope (LSST-DESC). (2015-) Participant, involved in the LSS and Photo-z working groups.

Awards and fellowships:

- Accredited as Profesor Contratado Doctor by ANECA, Spain (2023)
- Accreditation I3, Spain (2022).
- María Zambrano Atracción de Talento Internacional grant at the Universidad Complutense de Madrid, Spain (2021).
- Wonder of Science outreach award, Queensland, Australia (2017)
- DES Early Career Awards in Munich (2012), Berkeley (2013), Madrid (2015), Cambridge (2016) and Chicago (2017)
- Predoctoral grant JAE-Predoc (CSIC) at Institut de Ciències de l'Espai (IEEC-CSIC) (October 2009 - September 2013).

- Research stay JAE Predoc grant for a stay at the University of Sussex (June 2011) and University College of London (June-July 2012).
- Research summer grant for undergraduate students (JAE-Intro, CSIC) at Instituto de Física Teórica (U. Autónoma de Madrid) (July-September 2008).
- Diploma of Higher Education (University of Southampton, UK) Academic year: 2008/2009
- García de Galdeano Prize in Physics (Faculty of Sciences of the Universidad de Zaragoza, Spain, 2009)

Teaching activities:

- Lecturer of Observational Astrophysics at the Master of Physics of the Universe of the Universidad de Zaragoza (September 2024-July 2026)
- Lecturer of Calculo Diferencial of First year of Physics Degree of the Universidad de Zaragoza (September 2024-July 2026)
- Lecturer of Mathematical Methods of Second year of the Material Engineering Degree of the Universidad Complutense de Madrid (September 2023-July 2024)
- Lecturer of Calculus of First year of Electronic Communications Engineering Degree of the Universidad Complutense de Madrid (December 2022-July 2023)
- Lecturer of Mathematical Methods of Second year of the Material Engineering Degree of the Universidad Complutense de Madrid (September 2022- July 2023)
- Lecturer of Extragalactic Astrophysics at the Master of Physics of the Universe of the Universidad de Zaragoza (February - September 2022)
- Master thesis supervisor of Alberto Sánchez Fernández-Pedraza at the Master de Astrofísica of the Universidad Complutense de Madrid (October 2021 - July 2022), Project title: *Efecto de la estructura a gran escala en la cosmología con supernovas*
- Master thesis supervisor of David Fernández Gil at the Master de Astrofísica of the Universidad Complutense de Madrid (October 2020 - September 2021), Project title: *Cosmología con cartografiados extragalácticos en radiotelescopios*
- Lecturer of Observational Cosmology in the Física Experimental de Partículas y Cosmología at the Master de Física Teórica of the Universidad Complutense de Madrid (May 2021)

- Honours thesis co-supervisor of Chris Johnson at the University of Queensland (August 2017 - November 2018), Project title: *Cosmology through the topology of large scale structure using wide field photometric surveys*
- Summer research project co-supervisor of Chris Johnson at the University of Queensland (November 2016-January 2017), Title: *Microlensing - A Search Through the Interstellar Abyss*

Outreach Activities:

- Cosmology lecturer at Taller de Altas Energías 2024 International School, September 2024 at Centro de Ciencias de Benasque Pedro Pascual (Spain)
 - Cosmology lecturer at Taller de Altas Energías 2023 International School, September 2023 at Centro de Ciencias de Benasque Pedro Pascual (Spain)
 - Supervisor of High School Research project at IES Las Musas, (November 2022 - 2024) at Comunidad de Madrid, Madrid (Spain)
 - Cosmology lecturer at Phy6cool summer school, July 20 2022 at CIEMAT, Madrid (Spain)
 - Cosmology lecturer at Phy6cool summer school, July 21 2021 at CIEMAT, Madrid (Spain)
 - Outreach talk "Circunnavegando el Cosmos" at Semana de la Ciencia 2020, CIEMAT, Spain, November 10, 2020
 - Collaborated with the Hello Universe section of magazine Goraeganeulaedo to promote my research with high school students, Korea, 2020
 - Lecturer in the Queensland Junior Physics Olympiad at the University of Queensland, June 29, 2017
 - Young Science Ambassador Award 2017: Performing visits to schools in Queensland, Australia, to promote science and scientific thinking as a Young Science Ambassador of the Wonder of Science program.
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Committees and Conference Organization Activities:

- Member of Local Organising Committee of the Phy6cool summer school, July 2022 at CIEMAT, Madrid (Spain)
- Member of Local Organising Committee of the Phy6cool summer school, July 2021 at CIEMAT, Madrid (Spain)
- Member of Local Organising Committee of the CosKASI Conference, April 2019 at Seogwipo, Jeju (Korea)
- Member of the Local Organising Committee of the Dark Energy Survey, November 2017, Brisbane (Australia)
- Member of the CAASTRO Postdoctoral committee as the representative of the University of Queensland (February 2017 - February 2018, Australia)
- Jury member of the PhD Thesis panel of Martín Rodríguez Monroy at Universidad Complutense de Madrid ("Galaxy clustering with the Dark Energy Survey: measurement and systematics mitigation.", Spain, 2021)
- Examiner of Master and Honour Thesis at the University of Queensland (Australia).
- Organizer of OzDES weekly meetings since September 2016.
- Reviewer of scientific publications for MNRAS and Astrophysical Journal (Q1 journals).
- Reviewer of scientific projects for Agencia Nacional de Evaluación y Prospectiva (ANEP).

Reserch stays:

- Invited Visitor at the Korea Astronomy and Space Institute, Korea (12 February-25 February 2023). Host: Prof. David Parkinson
- Visitor at the Korea Astronomy and Space Institute, Korea (8 January-28 February 2020). Host: Prof. David Parkinson
- Visitor at the Universe of Queensland, Australia (25 June-5 July 2019). Host: Prof. Tamara Davis
- Visitor at the Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT) (8-11 October 2018). Host: Dr. Ignacio Sevilla-Noarbe

- Visitor at the Universe of Queensland, Australia (August 2017-March 2018).
Host: Tamara Davis
- Institut de Ciències de l'Espai (IEEC-CSIC), Spain (June 30 - July 4, 2014).
Host: Prof. Enrique Gaztañaga
- Department of Physics and Astronomy, University College London, UK (May 28 - July 13, 2012). Host: Prof. Ofer Lahav
- Astronomy Centre - University of Sussex, UK (June 1- July 1, 2011). Host: Dr. Antony Lewis

Summary of publications:

- Total number of publications: 102
- Total number of Q1 journal publications: 64
- Citations (ADS database): 8700
- h-index (ADS database): 37
- SAO/NASA Astrophysics Data System (ADS) is the standard digital library portal for researchers in astronomy and physics, operated by the Smithsonian Astrophysical Observatory (SAO) under a NASA grant)

Selected publications

- *Detection of an orthogonal alignment between parsec scale AGN jets and their host galaxies* Fernandez-Gil, D. Hodgson J. A, L'Huillier B., Asorey J., Sauder C., Finner K., Jee J., Parkinson D., Combes F., 2025, Nature Astronomy, 9, 302. (arXiv:2411.09099). Citations: 2
- *Cross-correlating the EMU Pilot Survey 1 with CMB lensing: Constraints on cosmology and galaxy bias with harmonic-space power spectra* Tanidis, K., Asorey, J. ; Saraf, C. S., Hale, C. L., Bahr-Kalus, B., Parkinson, D., Camera, S., Norris, R., Hopkins, A., Bilicki, M., Gupta, N., 2025, PASA, 9, 42, 062. (arXiv:2411.05913). Citations: 2

- *The Evolutionary Map of the Universe: A new radio atlas for the southern hemisphere sky* EMU Collaboration, Hopkins A. et al. (including **Asorey J.**), 2025, PASA, 9, 42, 071. (arXiv:2505.08271). Citations: 4
- *Euclid. I. Overview of the Euclid mission.* Euclid Collaboration (including **Asorey J.**), 2025, Astronomy& Astrophysics 697, (arXiv:2405.13491). Citations: 421.
- *The Dark Energy Survey: Cosmology Results with ?1500 New High-redshift Type Ia Supernovae Using the Full 5 yr Data Set* DES Collaboration, Abbot T. et al. (including **Asorey J.**), 2024, ApJL 973 L14 (arXiv:2401.02929). Citations: 317
- *Dark Energy Survey: A 2.1% measurement of the angular baryonic acoustic oscillation scale at redshift $z_{\text{eff}}=0.85$ from the final dataset* DES Collaboration, Abbot T. et al. (including **Asorey J.**), 2024, PRD, 110, id.063515. (arXiv:2402.10696). Citations: 36
- *Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument.* DESI Collaboration (including **Asorey J.**), 2022, Astronomical Journal, 167, id 62 (arXiv:2306.06307). Citations: 105.
- *A measurement of the integrated Sachs-Wolfe effect with the Rapid ASKAP Continuum Survey.* Bahr-Kalus B., Parkinson D., **Asorey J.**, Camera S., Hale C., Qin F., 2022, MNRAS, 517, 3785 (arXiv:2204.13436). Citations: 7.
- *Overview of the Instrumentation for the Dark Energy Spectroscopic Instrument.* DESI Collaboration (including **Asorey J.**), 2022, Astronomical Journal, 164, id 207 (arXiv:2205.10939). Citations: 188.
- *Dark Energy Survey Year 3 Results: A 2.7% measurement of Baryon Acoustic Oscillation distance scale at redshift 0.835.* DES Collaboration, Abbot T. et al. (including **Asorey J.**), 2022, Ph. Rev. D., 4, id.043512 (arXiv:2107.04646). Citations: 63.
- *Probing Ultra-light Axion Dark Matter from 21cm Tomography using Convolutional Neural Networks* Sabiu C., Kadota K., **Asorey J.**, Park I., 2022, JCAP 01, id020 (arXiv:2108.07972). Citations: 3.
- *The Evolutionary Map of the Universe Pilot Survey* Norris R., et al. (including **Asorey J.**), 2021, PASA 38, id e046 (arXiv:2108.00569). Citations: 106.
- *Future radio continuum cosmology clustering surveys* **Asorey J.**, Parkinson D., 2021, MNRAS, 506, 4121 (arXiv:2106.02303). Citations: 1.

- *The PAU Survey: Intrinsic alignments and clustering of narrow-band photometric galaxies.* Johnston H. et al. (including **Asorey J.**), 2021, A&A, 646,A147 (arXiv:2101.06921). Citations: 16.
- *HIR4: cosmological signatures imprinted on the cross-correlation between a 21-cm map and galaxy clustering* Shi F., Song Y-S., **Asorey J.**, Parkinson D., Ahn K., Yao J., Zhang L., Zuo S., 2020, MNRAS, 499, 4613 (arXiv:2006.01407). Citations: 4.
- *HIR4: cosmology from a simulated neutral hydrogen full sky using Horizon Run 4* **Asorey J.**, Parkinson D., Shi F., Ahn K., Song Y-S., Kim J., Yao J., Zhang L. and Zuo S., 2020, MNRAS, 495, 1788 (arXiv:2001.00833). Citations: 15.
- *Cosmological Constraints from Multiple Probes in the Dark Energy Survey* DES Collaboration, Abbot T. et al (including **Asorey J.**), 2019, PhRvL, 122, id.171301 (arXiv:1811.02375). Citations: 99.
- *First Cosmology Results using Type Ia Supernovae from the Dark Energy Survey: Constraints on Cosmological Parameters* DES Collaboration, Abbot T. et al (including **Asorey J.**), 2019, ApJL, 872, id. L30 (arXiv:1811.02374). Citations: 261.
- *The Dark Energy Survey: Data Release 1* DES Collaboration, Abbot T. et al (including **Asorey J.**), 2018, ApJS, 239, id.18 (arXiv:1801.03181). Citations: 580.
- *Dark Energy Survey Year 1 Results: Cosmological Constraints from Galaxy Clustering and Weak Lensing* DES Collaboration, Abbot T. et al (including **Asorey J.**), 2018, PhRvD, 98, id.043526 (arXiv:1708.01530). Citations: 1052.
- *OzDES multifibre spectroscopy for the Dark Energy Survey: Three year results and first data release.* Childress M. J., Lidman C., Davis T. M., Tucker B. E., **Asorey J.**, Yuan F. et al., 2017, MNRAS, 472, 273 (arXiv:1708.04526). Citations: 78
- *Galaxy clustering with photometric surveys using PDF redshift information.* **Asorey J.**, Carrasco-Kind M, Sevilla-Noarbe I., Brunner R. J., Thaler J., 2016, MNRAS, 459, 1293 (arXiv:1601.00357). Citations: 17.
- *Redshift-space distortions from the cross-correlations of photometric populations.* **Asorey J.**, Crocce M., Gaztañaga E., 2014, MNRAS, 445, 2825-2835 (arXiv:1305.0934). Citations: 18.
- *Recovering 3D clustering information using angular correlations* **Asorey J.**, Crocce M., Gaztañaga E., Lewis A., 2012 MNRAS, 427, 1891-1902 (arXiv:1207.6487). Citations: 76.

Computer skills:

- *User of Operative Systems:* Linux, Windows and MacOSX.
- *Programming languages:* C, C++, Fortran, Python, R, Root, Mathematica, Gnu-plot, SuperMongo, SQL.
- *Experience as user of publicly available Cosmology and Astrophysics codes:* CosmoMC, CAMB, CAMB-sources (some modifications done to these codes), CLASS, Emcee, TPZ (machine learning photometric redshift code), MARZ (red-shifting).
- *Use of high-performance computers:* Experience as user of U.S. National Science Foundation CPU supercomputer Stampede (Texas Supercomputing Centre), U.S. Department of Energy CPU supercomputers Cori & Edison (NERSC) and use of Australian Government CPU supercomputer Magnus (Western Australia Pawsey Supercomputer Centre). Successful submission of project to the Korea Institute of Science and Technology Information (KISTI) program.
- Experience on data analysis of big datasets from OzDES and DES catalogues and also extensive use of the Mare Nostrum Institut ce Ciènces de l'Espai N-body simulations (MICE) or the Horizon Run 4 simulation (HR4).

Professional Development Courses:

- Course on Neural Networks applied to Scientific-technical problems at Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT).
 - Course on Advanced Academic Writing and Advanced Academic Presentations by the University of Illinois at Urbana-Champaign.
 - Coursera course on Data Analysis by John Hopkins University.
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