

## Curriculum Vitae of Prof. Raul Jimenez (PhD)

May 3, 2026

Current position: ICREA Research Professor at ICC, University of Barcelona.  
Contact Address: Institute of Cosmos Sciences (ICC)  
University of Barcelona  
Martí i Franques 1, Barcelona 08028, Spain  
Telephone: (+34) 610299028  
Homepage: <https://sites.google.com/site/rauljimenez/>  
ORCID: 0000-0002-3370-3103  
Email: raul.jimenez@icc.ub.edu  
Date of birth: 10th January 1967  
Place of birth: Madrid, Spain  
Citizenship: EU (Spanish)

### PERSONAL STATEMENT

I am a theoretical physicist interested in a number of problems in cosmology and astrophysics. My research ranges from the physics of the early universe to the physics of stars. The main drive of my research is to connect ideas in theoretical physics to observable phenomena and in turn explain new observations. The main objective of my research is to understand the fundamental laws of nature using cosmological and astronomical observations. My main topics of research change from time to time to adjust to advances in the field and include: cosmological parameters, the age of the universe, stellar evolution, stellar populations, high-redshift galaxies, dark energy, the early universe, large scale structure, the cosmic microwave background, galaxy formation and evolution, star formation, and the interstellar medium. I am especially interested in analysing large datasets and in the development of rigorous statistical algorithms. In the past years I have focussed on developing methods and techniques that are independent of the assumptions of the cosmology model to explore the fundamental laws of nature. I have also developed new models to explain the origin and evolution of the Universe that have the feature of having no free parameters and are based on quantum gravity and information theory. I am very active in science and public policy and have recently written extensively on the role that Bayesian statistics, large data, machine and deep learning and robotization can have on our societies.

Among my main contributions to our understanding of the Universe are: the first evidence of dark energy from the ages of high redshift galaxies and globular clusters, the origin of dark galaxies, the first clue of how galaxies are assembled as a function of time, the first determination of the expansion history of the Universe, the role of cosmic explosions in the survival of exo-life, the role of symmetries in the universe, a lower bound to the cosmological constant, an accurate and precise age of the universe, the development of theoretical tools to model analytically the large scale structure, the first strong evidence for the hierarchy of neutrinos and a new model of the universe based on quantum information theory and gravity.

### EDUCATION

**Ph.D.** in Physics, Niels Bohr Institute, University of Copenhagen, June 1995. “On Globular Clusters, Mass Loss, Stellar Evolution and the Age of the Universe”. Supervisors: *Uffe Jørgensen & Bernard Pagel*.

**M.Sc** in Theoretical Physics, Autonomous University of Madrid, Dec. 1992.

**B.Sc.** in Theoretical Physics with Honors, Autonomous University of Madrid, June 1991.

High-School Diploma, I.E.S. Cervantes, Madrid, June 1985.

Master Builder Degree, 1982.

**CAREER**

**9/2015 – 8/2016:** Radcliffe Fellow, Harvard University, USA.  
**8/2014 – 1/2026:** Visiting Professor, ICIC, Imperial College, London, UK.  
**9/2012 – 8/2013:** Scientific Associate. CERN Theory Group, CERN, Switzerland.  
**9/2007 – present:** ICREA Professor of Theoretical Physics and Cosmology. University of Barcelona, Spain.  
**6/2007 – 4/2009** Visiting Senior Research Fellow. Dept. of Astrophysical Sciences, Princeton University, USA.  
**1/2003 – 8/2007:** Professor. Dept. of Physics & Astronomy, University of Pennsylvania, USA.  
**7/2000 – 12/2002:** Professor. Dept. of Physics & Astronomy, Rutgers University, USA.  
**9/1999 – 8/2000:** PPARC Advanced Fellow. Institute for Astronomy. University of Edinburgh, UK.  
**9/1995 – 8/1999:** Research Fellow. Institute for Astronomy. University of Edinburgh, UK.  
**1/1993 – 8/1995:** European Union HCM fellow. Niels Bohr Institute and NORDITA, Copenhagen, DK.  
**1991 – 1992:** Autonomous University of Madrid/CAJAMADRID fellow. Madrid, Spain.  
**1983 – 1991:** During this period I worked, concurrently as I studied, as a master builder and car mechanic. I am fully certified in both trades and have the degree of master builder.

**PROFESSIONAL ESTEEM INDICATORS**

Citation count: > **25000**; h-index: **80**; i-10 index **190**; Number of reads: > **150000**  
 There are: **6** papers > 1000 citations; **10** papers > 500 citations; **21** papers > 250 citations; **60** papers > 100 citations; **190** papers > 10 citations (all data according to Google Scholar and ADS). Total of **305** publications. Organizer/session convener at more than **30** international symposia. Over **350** invited presentations, including seminars, colloquia, and international conferences.

**LONG TERM VISITING POSITIONS**

**7/2019:** Radcliffe Fellow, Harvard University, USA.  
**9/2018 – 12/2018:** Distinguished visiting CNRS professor at the Henri Poincare Institute program "Analytics, Inference, and Computation in Cosmology", Paris, France.  
**7/2018:** Radcliffe Fellow, Harvard University, USA.  
**7/2017:** Radcliffe Fellow, Harvard University, USA.  
**9/2015 – 8/2016:** Visiting Professor, ITC, Harvard University, USA.  
**3/2014 – 2/2017:** Scientific Associate. Computer Science, IACS, Harvard University, Cambridge, USA.  
**6/2012:** Faculty Member. GGI, Florence, Italy.  
**5/2011 – 7/2015:** Visiting Scientist at Theory Group, CERN, Geneva, Switzerland.  
**11/2010:** HEPHACOS Visiting Professor, IFT/UAM, Madrid, Spain.  
**9/2010:** Distinguished Visiting Professor, Department of Astronomy, PUC, Santiago de Chile, Chile.  
**3/2010:** Visiting Professor. IPMU, University of Tokyo, Japan.  
**9/2009:** Scientific Associate. CERN Theory Division, Geneva, Switzerland.  
**1/2009 – 3/2009:** Faculty Member. GGI, Florence, Italy.  
**8/2007 – 10/2007:** Faculty Member. KITP, Santa Barbara, USA.  
**12/2006:** Distinguished Visiting Professor. ASTROCAM. Madrid, Spain.  
**4/2006 – 5/2006:** Distinguished Visiting Theory Professor. Carnegie Observatories. Pasadena, USA.  
**11/2005 – 12/2005:** Visiting member. Institute for Advanced Studies, Princeton, USA.  
**10/2005:** Visiting Professor. Dept. of Physics. U. of California Santa Barbara, USA.  
**10/2005:** Visiting Professor. Theoretical Astrophysics Group, Caltech, USA.  
**7/2005:** Visiting Professor. Institute for Astronomy, The University of Edinburgh, UK.  
**8/2003:** Visiting Professor. Theoretical Astrophysics Group, Caltech, USA.  
**7/2002 – 8/2002:** Visiting Professor. Institute for Astronomy, The University of Edinburgh, UK.  
**7/2001 – 8/2001:** Visiting Professor. Institute for Astronomy, The University of Edinburgh, UK.  
**5/2001 – 6/2001:** Visiting Scholar. Theoretical Astrophysics Group, Caltech, USA.  
**5/2000 – 8/2000:** Visiting Scholar. Theoretical Astrophysics Group, Caltech, USA.  
**2/1999 – 5/1999:** Visiting Scholar. Columbia University, NYC, USA.  
**6/1993 – 8/1993:** Visiting Scholar. University of Delaware, USA.

**PROFESSIONAL HONOURS AND AWARDS**

Ranked top 0.5% world-wide scientist by Stanford, 2017-2025 (A standardized citation metrics author database).  
 Henri Poincaré Institute/CNRS distinguished visiting professor, Fall 2018.  
 Radcliffe Fellow, Harvard University, 2015.  
 Distinguished Visiting Scientist at Joint ALMA Observatory, 2014.  
 Salvador de Madariaga award, 2013.  
 EU-IRG award, 2007.  
 Distinguished visiting professor at the ASTROCAM, 2006.  
 Distinguished visiting theory professor at the Carnegie Observatories in Pasadena, 2006.  
 PPARC Advanced Fellowship, 1999-2004.  
 Spanish Research Council Postdoctoral Fellowship, 1996-1997.  
 European Union (TMR, Marie Curie) Fellowship, 1995.  
 European Union (HCM, Marie Curie) Fellowship, 1993-1994.  
 Autonomous University of Madrid/CAJAMADRID Fellowship, 1991-1992.  
 Tuition Scholarship from the Spanish Research Council, 1986-1990.

**SERVICE TO THE ASTRONOMICAL COMMUNITY**

Referee for ApJ, A&A, MNRAS, PRD, PRL, PLB, Nature and Science. I serve as a grant reviewer for PPARC (UK), EU grants and NASA, NSF (USA), CONACYT (Mexico) and Danish NSF.

**SERVICE TO THE COMMUNITY**

At Rutgers I served on the PhD qualifier committee (2001 – 2002). At UPenn I served on the PhD recruiting committee (2003) and the computing committee (2004 – 2006). I also served on the college of Arts & Sciences initiative to review the general requirement education. I organized the astro-seminars in Fall 2005 and Fall 2006. I also served on two faculty search committees at UPenn: hire of Ravi Sheth and Mariangela Bernardi (2004) and hire of Masao Sako (2006). In Barcelona I have helped to reorganise the teaching curriculum and the cosmology group attracting long term postdoctoral fellows and faculty members (hire of Olga Mena, Paolo Padoan, Steve Giddings, Cristiano Germani, Nick Kaiser, Fred Courbin). I am leading the CosmoCLASSIC collaboration (<https://sites.google.com/a/g.harvard.edu/cosmoclassic/home>). I am organizer and main originator of the highly successful "Unsolved Problems in Astrophysics and Cosmology" which takes place every 4 years and started in 2002 <https://unsolved.pages.ista.ac.at>.

**FUNDING HISTORY**

ERC Synergy "RedH0t" (co-I); September 2026 - August 2032 (EUR 12,500,000).  
 Simons Foundation "The Geometry of Flows" (PI); July 2025 - August 2035 (\$ 2,000,000).  
 Maria de Maeztu excellence unit (co-I) to ICCUB CEX2025-000918-M; April 2025 - December 2028 (EUR 2,000,0000).  
 Plan Generacion del Conocimiento (co-PI) PID2022-141125NB-I00; September 2023 - August 2027 (EUR 340,000).  
 AGAUR SGR-Cat 2021/00872 (co-PI) January 2022 - June 2025 (EUR 40,000).  
 Maria de Maeztu excellence unit (co-I) to ICCUB CEX2019-000918-M; January 2020 - December 2024 (EUR 2,000,0000).  
 Plan Generacion del Conocimiento (PI) PGC2018-098866-B-I00; January 2019 - December 2022 (EUR 228,448).  
 AGAUR GGC2017A (co-PI); January 2018 - December 2019 (EUR 65.896).  
 Radcliffe fellowship 2015-2016 (\$100,000).  
 Plan Nacional (PI) AYA2014-58747-P; January 2015 - December 2018 (EUR 227,480).  
 Maria de Maeztu excellence unit (co-I) to ICCUB MDM-2014-0369; January 2015 - December 2018 (EUR 2,000,0000).  
 Royal Society, International Exchanges 2014/R1 (co-I) September 2014 - September 2017 (GBP 12,000).  
 AGAUR SGR2014 (PI); September 2014 - August 2016 (EUR 15,000).  
 Plan Nacional (co-PI); FPA2011-29678; January 2012 - December 2014 (EUR 150,040).  
 AGAUR SGR2009 (PI); September 2009 - December 2013 (EUR 42,640).  
 Plan Nacional (co-PI) AYA2008-03531; January 2009 – December 2011 (EUR 240,000).  
 DOE grant (co-PI); September 2008 – August 2009 (\$ 108,800).  
 IRG EU grant (PI); October 2007 – October 2011 (EUR 100,000).

I3 grant (PI); October 2007 – December 2008 (EUR 50,000).  
 CONSOLIDER-INGENIO grant (co-PI); September 2007 – August 2012 (EUR 5,000,000).  
 DOE grant DE-FG02-07ER41514 (co-PI); September 2007 – August 2008 (\$100,000).  
 NASA GALEX legacy grant (PI); September 2007 – August 2009 (\$125,000).  
 NSF grant 0607654 (co-PI); July 2006 – June 2009 (\$354,707).  
 NSF-PIRE grant 0530095 (Penn PI); October 2005 – September 2010 (\$2,350,000).  
 NSF grant AST-0507768 (co-I); July 2005 – June 2008 (\$351,948).  
 NASA-ATP grant NNG05GG01G (co-I); July 2005 – June 2008 (\$310,000).  
 NSF grant AST-0408698 for the Atacama Cosmology Telescope (co-I); January 2004 - January 2009 (\$10,900,000).  
 University of Pennsylvania: start-up package (2003) (\$100,000).  
 NSF grant AST-0206031 (PI); July 2003 – August 2006 (\$225,000).  
 PPARC grant; Summer salary as a Visiting Professor at the IfA, The University of Edinburgh, 2001-2002 (\$50,000).  
 Rutgers University (2000); start-up package (\$100,000).

Total of ~\$ 50,000,000 (not adjusted for inflation)

### **TEACHING EXPERIENCE**

I have taught the following courses at UAB (Barcelona): Advanced Astrophysics (graduate course, Fall 2007). I have taught the following courses at UPenn: The interstellar medium (graduate course, Spring 2003); Survey of the Universe (undergraduate course 001, Fall 2003; Spring 2006); Classical Electrodynamics (graduate course 516, Spring 2004; Spring 2005); Introduction to Astrophysics (undergraduate course 011, Fall 2004; Spring 2006; Fall 2006).

I have taught the following undergraduate courses at Rutgers: Principles of Astrophysics (Course 341; Fall 2001, Fall 2002); Principles of Astrophysics (Course 342; Spring 2002).

I was the co-PI of the NSF-PIRE funded "Southern Cosmology Survey" education initiative. This 5-year project (2005-2010) consisted of twice a year summer schools in Princeton, Barcelona, South Africa and Chile for advanced undergraduates and graduate students to educate them in subjects of frontier research in Cosmology and Astrophysics.

### **SUPERVISED PhD STUDENTS**

Louisa Nolan (Edinburgh, PhD 1997–2001, co-supervised with James Dunlop), Christian Reichardt (Caltech, SURF student 2000), Benjamin Panter (Edinburgh, PhD 2001-2004; co-supervised with Alan Heavens), Carolyn Sealfon (UPenn, PhD 2003-2006), Rita Tojeiro (Edinburgh, PhD 2005-2008; co-supervised with Alan Heavens), Zach Berta (Barcelona, MSc 2007), Joaquin Prieto (Universidad Catolica Chile, PhD 2005-2010), Hector Gil (Barcelona, PhD 2008-2012), Michele Moresco (Bologna, PhD 2010-2012; co-supervised with Andrea Cimatti), Francesca Frangkoudi (Barcelona, MSc 2011), David Figueruelo Hernan (MSc 2018-2019), David Valcin (PhD 2017-2021; co-supervised with Licia Verde), Ali Rida Khalifeh (PhD 2018-2022), Beatriz Hernandez-Molinero (PhD 2021-2025; co-supervised with Carlos Pena-Garay), Davyd Ilnytskyi (MSc, 2026), Pedro Tarancon (PhD 2023-2027; co-supervised with David Mateos), Pablo Tejerina (PhD 2023-2027), Ginevra Braga (PhD 2025-2027; co-supervised with Sabino Matarrese), Leonid Saredidine (PhD 2024-2028), Pau Sole Vilaro (PhD 2024-2027; co-supervised with David Mateos), Mariam Abdelaziz (2025; visiting PhD student), Marisol Traforetti (PhD 2025-2029), Ali Kalout (PhD 2025-2029), Antonio Gil (PhD 2026-2030), Mohammad Fakhredin (PhD 2026-2030).

### **SUPERVISED POSTDOCTORAL RESEARCHERS**

Chris Power (2002), Carlos Hernandez-Monteagudo (2005-2007), Viviana Acquaviva (2006-2008), Abilio Mateus (2007), Carmelita Carbone (2007-2009), Beth Reid (2008-2010), Anastasios Avgoustidis (2009), Christian Wagner (2009-2012), Ben Hoyle (2009-2012), Joaquin Prieto-Brito (2010-2013), Jorge Noreña (2010-2013), Aday Robaina (2010-2012), Roland de Putter (2010-2012), Jose Manuel Marti (2011), Antonio Cuesta (2013-2017), Fergus Simpson (2014-2017), Emilio Bellini

(2014-2016), Bin Hu (2016-2017), Alvis Racanelli (2016-2018), Benedict Kalus (2017-2020), Daniele Bertacca (2018), Ilia Musco (2018-2019), Alex Mead (2018-2019), Davide Bianchi (2018-2021), Hector Gil-Marín (2018-2021; La Caixa junior leader), Davide Gualdi (2019-2022), Nils Shoneberg (2021-2024), Ben Giblin (2022-2023), Konstantin Kharchev (2025-2028), Sebastian Waeber (2026-2029), David Valcin (2026-2029), Giada Casali (2027-2030).

### **OBSERVING EXPERIENCE**

Observer at ESO/La Silla, La Palma (INT, WHT) and Hawaii (Keck, UKIRT).  
 HST observing time granted in Cycle 7 (WFPC2 and NICMOS).  
 GALEX legacy program granted in Cycle 3 (207 ksec).  
 GTC: outflow program (2010).

### **INVITED REVIEW TALKS, COLLOQUIA AND SEMINARS** (about 8–10 a year accepted; I decline a similar number of invitations each year to which I send my students/postdocs)

February 2027 *Invited keynote speaker*: “Accurate Stellar Ages for Cosmology”, Benasque, Spain.  
 January 2027 *Invited keynote speaker*: “From Cosmic Chronometers to Quantum Horizons”, Baqueira-Beret, Spain.  
 January 2027 *Invited keynote speaker*: “The Geometry of Flows”, Baqueira-Beret, Spain.  
 September 2026 *Invited keynote speaker*: “CosmoClassic”, Asiago, Spain.  
 August 2026 *Invited keynote speaker*: “New Frontiers in Cosmology”, A Coruña, Spain.  
 August 2026 *Invited speaker*: “Game Theory and AI”, Chernivsi, Ukraine.  
 July 2026 *Invited keynote speaker*: “Unsolved problems 2026”, ISTA, Vienna, Austria.  
 June 2026 *Invited seminar*: “The Random Universe”, Imperial College, London, UK.  
 June 2026 *Invited keynote speaker*: “The Geometry of Flows”, NYU, New York, USA.  
 April 2026 *Invited colloquium*: “Kapteyn Institute”, Groningen, Netherlands.  
 March 2026 *Invited keynote speaker*: “Beyond Machine Learning”, Laboratorio Subterráneo Canfranc, Canfranc, Spain.  
 February 2026 *Invited colloquium*: “Sommerfeld Theory Colloquium”, LMU, Munich, Germany.  
 November 2025 *Invited keynote speaker*: “7th BIG Meeting: Barcelona Initiative for Gravitation”, Barcelona, Spain.  
 October 2025 *Invited keynote speaker*: “The Geometry of Flows”, ETH, Zurich, CH.  
 October 2025 *Invited keynote speaker*: “The Complex Universe”, IFT-UAM, Madrid, Spain.  
 September 2025 *Invited seminar*: “The Denario Project”, ICCUB, Barcelona, Spain.  
 September 2025 *Invited speaker*: “Learning the Deep Mysteries of Nature with Cosmology”, Fiera de Primiero, IT.  
 August 2025 *Invited speaker*: “Lviv Data Science Summer School 2025”, Lviv, Ukraine.  
 July 2025 *Invited speaker*: “SEENET-MTP” workshop, Bucharest, Romania.  
 July 2025 *Invited speaker*: “CERN/SEENET-MTP/ICTP PhD Training Program”, Magurele, Romania.  
 June 2025 *Invited speaker*: “European Astronomical Society, EAS 2025”, Cork, Dublin.  
 May 2025 *Invited keynote speaker*: “The Dawn of Gravitational Wave Cosmology”, Benasque, Spain.  
 April 2025 *Invited keynote speaker*: “The Geometry of Flows”, IAS, Princeton, USA.  
 November 2024 *Invited keynote speaker*: “Turbulent Flows and Structure”, Simons Foundation, NYC, USA.  
 Oct. 2024 *Invited keynote speaker*: “4th Conf. on Quantum Gases, Fundamental Interactions, and Cosmology”, Pisa, IT.  
 October 2024 *Invited Speaker*: “The Complexity of the Cosmos”, GSSI, L’Aquila, Italy.  
 September 2024 *Invited speaker*: “CosmoClassic”, Asiago, Italy.  
 September 2024 *Invited speaker*: “Asiago Cosmology Dedicated Meeting”, Asiago, Italy.  
 August 2024 *Invited seminar*: Kavli IPMU, Tokyo, Japan.  
 July 2024 *Invited speaker*: “Quantum Aspects of Inflationary Cosmology”, MIAPbP, Munich, Germany.  
 May 2024 *Invited seminar*: School of Mathematics and Physics, The University of Queensland, Brisbane, Australia.  
 May 2024 *Invited seminar*: SIFA, University of Sydney, Sydney, Australia.  
 February 2024 *Invited seminar*: IA: Investigación y Sociedad, UB, Barcelona, Spain.  
 October 2023 *Invited seminar*: Laboratorio Subterráneo Canfranc, LSC, Canfranc, Spain.  
 October 2023 *Invited speaker*: “Asiago Cosmology Dedicated Meeting”, Asiago, Italy.  
 October 2023 *Invited seminar*: Data Science Department. SISSA, Italy.

September 2023 *Invited keynote speaker*: “The Complexity of the Cosmos”, GSSI, L’Aquila, Italy.  
 September 2023 *Invited speaker*: “Model Independent Cosmology”, Jornada COSCE 2023, Madrid, Spain.  
 March 2023 *Invited speaker*: “MAGIC23”, Praia do Rosa, Brasil.  
 November 2022 *Invited seminar*: Joint Cosmology Seminar, Imperial College, London, UK.  
 October 2022 *Invited colloquium*: Bologna Joint Astrophysical Colloquium (JAC), Bologna, IT.  
 October 2022 *Invited keynote speaker*: “Quantum Information and Cosmology”, GSSI, L’Aquila, Italy.  
 September 2022 *Invited speaker*: “Asiago Cosmology Dedicated Meeting”, Asiago, Italy.  
 September 2022 *Invited speaker*: “Vulcano 2022-Frontier Objects in Astrophysics and Particle Physics”, Elba, Italy.  
 June 2022 *Invited speaker*: “EAS 2022; Shedding light on the dark side of the Universe”, Valencia, Spain.  
 June 2022 *Invited seminar*: Physics Department, University of Illinois, Urbana-Champaign, USA.  
 June 2022 *Invited speaker*: “Astrophysics in the Next Decade: From the First Stars to Intelligent Life”, USA.  
 April 2022 *Invited keynote speaker*: “Likelihood Free Inference”, IAP, Paris, France.  
 November 2021 *Invited keynote talk*: “Accelerating Universe 2.0”, MIAPP, Munich, Germany.  
 September 2021 *Invited colloquium*: Physics Dept. Nis University, Nis, Serbia.  
 September 2021 *Invited keynote talk*: “BW2021 congress”, Belgrade, Serbia.  
 September 2020 *Invited talk*: “Workshop on Quantum Fields and Nonlinear Phenomena”, Craiova, Romania.  
 September 2020 *Invited lecture*: “SEENET-MTP graduate school”, Craiova, Romania.  
 May 2020 *Invited seminar*: Dept. of Physics and Astronomy, Padova, IT.  
 January 2020 *Invited colloquium*: Niels Bohr Institute, Copenhagen, DK.  
 January 2020 *Invited seminar*: IFT/CSIC, Madrid, Spain.  
 December 2019 *Invited keynote talk*: “Stellar ages across cosmic times”, Napa, USA.  
 December 2019 *Invited keynote talk*: “COSYNE”, IAP, Paris, France.  
 October 2019 *Invited talk*: “Fundamental Physics with Future CMB Probes”, IFPU, Trieste, IT.  
 June 2019 *Invited talk*: “Zooming in on Star Formation”, Nafplio, Greece.  
 June 2019 *Invited plenary talk*: “The nature of Dark Matter and Large Scale Structure”, Nicosia, Cyprus.  
 March 2019 *Invited plenary talk*: “The Most Ancient Heavens”, Royal Astronomical Society, London, UK.  
 February 2019 *Invited seminar*: Dept. of Physics and Astronomy, Padova, IT.  
 December 2018 *Invited colloquium*: Institut Henri Poincare, Paris, France.  
 November 2018 *Invited seminar*: ICIC, Imperial College, London, UK.  
 November 2018 *Invited talk*: “Probing the Dark Universe: OAJ-LSC synergies”, Zaragoza, Spain.  
 September 2018 *Invited talk*: “Analytical Methods”, Henri Poincare Institute, Paris, France.  
 September 2018 *Invited talk*: “Cosmological and Astrophysical Synergies: Tactics for the Latest Era”, Tagliolo, Italy.  
 July 2018 *Invited plenary chair*: “Unsolved Problems in Astrophysics”, Budapest, Hungary.  
 June 2018 *Invited talk*: “Multi-Messenger: The New Frontier of Cosmology”, Venice, Italy.  
 September 2017 *Invited seminar*: Physics Department, American University of Beirut, Lebanon.  
 June 2017 *Invited colloquium*: Institute for Astronomy, University of Edinburgh, UK.  
 May 2017 *Invited colloquium*: Astrophysics group, Imperial College, London, UK.  
 April 2017 *Keynote talk*: “Neutrino Cosmology”, CCA Simons Center, New York, USA.  
 March 2017 *Plenary talk*: “XVII International Workshop on Neutrino Telescopes”, Venice, IT.  
 January 2017 *Invited talk*: “The vacuum of the Universe: from cosmology to particle physics”, Barcelona, Spain.  
 November 2016 *Invited talk*: “Cosmoclassic”, Paris, France.  
 July 2016 *Keynote talk*: “JAP@60: Cosmology in the next 35 years”, Cortina D’ampezzo, Italy.  
 April 2016 *Invited seminar*: Physics dept. Case-Western University, Cleveland, USA.  
 April 2016 *Invited lecture*: CosmoStatSchool, Leon, Mexico.  
 March 2016 *Invited seminar*: Physics Department Cosmology Seminar, Dartmouth College, USA.  
 December 2015 *Invited talk*: “Cosmology and First Light: A conference at the IAP in Paris”, Paris, France.  
 November 2015 *Invited colloquium*: Radcliffe colloquium, Harvard University, USA.  
 November 2015 *Invited seminar*: Dept. of Astrophysical Sciences, Princeton University, USA.  
 October 2015 *Invited seminar*: Joint Tufts/MIT Cosmology Seminar, USA.  
 September 2015 *Invited talk*: “Sabino @60”, Castiglioncello, Italy.  
 August 2015 *Invited seminar*: ICIC, Imperial College, London, UK.

May 2015 *Invited colloquium*: Mount Stromlo Observatories, ANU, Australia.  
 May 2015 *Invited colloquium*: Astronomy Dept., Swinburne University, Australia.  
 May 2015 *Invited colloquium*: Astronomy Dept., University of Melbourne, Australia.  
 May 2015 *Invited colloquium*: Physics Dept., University of Melbourne, Australia.  
 April 2015 *Invited talk*: “Stars, Interstellar Medium, Galaxies and the chemistry between them”, Madrid, Spain.  
 January 2015 *Invited presentation*: “BASP2015”, Villars-sur-Ollon, Switzerland.  
 January 2015 *Invited seminar*: IFT, CSIC-UAM, Madrid, Spain.  
 October 2014 *Invited talk*: “Multiple Messengers and Challenges in Astro-particle Physics”, L’Aquila, Italy.  
 August 2014 *Invited seminar*: Imperial College, London, UK.  
 June 2014 *Invited talk*: “Unsolved problems in Cosmology and Astrophysics”, Budapest, Hungary.  
 June 2014 *Invited summary talk*: NAM 2016, UK.  
 June 2014 *Invited talk*: National Astro-particle Meeting, Canfranc, Spain.  
 June 2014 *Invited seminar*: Arnold Sommerfeld Center, LMU, Munich, Germany.  
 May 2014 *Invited seminar*: Racah Institute of Physics, Hebrew University, Israel.  
 May 2014 *Invited seminar*: i-Core Astrophysics, Israel.  
 March 2014 *Invited colloquium*: Physics Dept. Brown University, USA.  
 March 2014 *Invited colloquium*: IACS, Harvard University, Boston, USA.  
 January 2014 *Invited lecture*: “XLII International Meeting on Fundamental Physics”, Benasque, Spain.  
 January 2014 *Invited seminar*: Dept. of Physics & Astronomy Galileo Galilei, Padova, Italy.  
 October 2013 *Invited talk*: “II Russian-Spanish Congress”, Saint Petersburg, Russia.  
 Sept. 2013 *Invited talk*: “Chemical evolution in the Universe: the next 30 years”, Castiglione della Pescaia, Italy.  
 June 2013 *Invited talk*: “Cosmology and Fundamental Physics with Planck”, CERN theory institute, Switzerland.  
 May 2013 *Invited colloquium*: STARPLAN centre, NBI, University of Copenhagen, Denmark.  
 April 2013 *Invited talk*: “BW 2013: Beyond the Standard Models”, Vrnjacka Banja, Serbia.  
 April 2013 *Invited seminar*: ISCAP, Columbia University, New York, USA.  
 April 2013 *Invited seminar*: Astronomy Department, Columbia University, New York, USA.  
 April 2013 *Invited seminar*: Physics & Astronomy Dept., John Hopkins University, Baltimore, USA.  
 April 2013 *Invited seminar*: Joint JILA/CASA/U. of Colorado, Boulder, USA.  
 April 2013 *Invited seminar*: School of Earth and Space Exploration, Arizona State University, Phoenix, USA.  
 April 2013 *Invited seminar*: ITC, Harvard University, USA.  
 March 2013 *Invited review talk*: “Cosmostats”, Banff, Canada.  
 March 2013 *Invited seminar*: Theoretical Physics Department, University of Geneva, Geneva, Switzerland.  
 February 2013 *Invited talk*: “Dark Energy Phenomenology”, PCCP workshop, APC, Paris, France.  
 January 2013 *Invited talk*: Astro-particle seminar, CERN, Geneva, Switzerland.  
 September 2012 *Invited talk*: “Theoretical methods for non-linear cosmology”, CERN, Geneva, Switzerland.  
 June 2012 *Invited colloquium*: SNS, Pisa, Italy.  
 June 2012 *Invited talk*: “What is  $\nu$  ?”, GGI, Florence, Italy.  
 May 2012 *Invited colloquium*: Physics & Astronomy Dept. Tel-Aviv University, Israel.  
 May 2012 *Master Class*: Physics Dept. Hebrew University, Jerusalem, Israel.  
 May 2012 *Invited colloquium*: Physics Dept. Hebrew University, Jerusalem, Israel.  
 March 2012 *Invited colloquium*: Kavli Institute for Astronomy and Astrophysics (KIAA), Beijing, China.  
 March 2012 *Invited colloquium*: Beijing Normal University, Beijing, China.  
 March 2012 *Invited colloquium*: National Astronomical Observatories, Beijing, China.  
 January 2012 *Invited talk*: “Inflationary Theory and Its Confrontation with Data in the Planck Era”, Aspen, USA.  
 December 2011 *Invited chair*: “IFT inaugural conference”, Madrid, Spain.  
 August 2011 *Invited talk*: “Particle Physics from TeV to the Planck Scale, BW2011”, Serbia.  
 June 2011 *Invited talk*: “Statistical Challenges in Modern Astronomy V”, Penn State University, USA.  
 May 2011 *Invited seminar*: Physics Department, University of Zurich, Switzerland.  
 April 2011 *Invited talk*: “The Quantum Universe”, Gronningen, Holland.  
 Feb. 2011 *Invited talk*: “Unsolved problems in astrophysics and cosmology”, Benasque Center for Physics, Spain.  
 January 2011 *Invited colloquium*: IAP, Paris, France.

December 2010 *Invited lectures*: “Theory for observers - Observations for theorists”, Passo del Tonale, Italy.

November 2010 *Invited seminar*: MPA-Garching, Germany.

October 2010 *Invited colloquium*: ICTP, Trieste, Italy.

September 2010 *Invited colloquium*: IfA, University of Edinburgh, Edinburgh, UK.

September 2010 *Invited colloquium*: Dept. of Astronomy, Universidad Catolica de Chile, Santiago de Chile, Chile.

July 2010 *Invited talk*: “6th Patras Workshop on Axions, WIMPs and WISPs”, Zurich University, Zurich, CH.

July 2010 *Invited talk*: “From planets to galaxies”, Eotvos University, Budapest, Hungary.

June 2010 *Invited talk*: “European Workshop on String theory 2010”, Madrid, Spain.

June 2010 *Invited talk*: “The Almost Gaussian Universe”, SACLAY, Paris, France.

April 2010 *Invited seminar*: IFT/UAM, Madrid, Spain.

April 2010 *Invited seminar*: ICT, Harvard University, USA.

March 2010 *Invited seminar*: Dept. of Astronomy, Kyoto University, Japan.

March 2010 *Invited seminar*: IPMU, University of Tokyo, Japan.

December 2009 *Invited colloquium*: Benozzi Center for Astrophysics, Weizmann Institute, Israel.

December 2009 *Invited address*: Astrophysics at the Extreme, TsviFest, Hebrew University, Israel.

November 2009 *Invited seminar*: join CTC/IoA/DAMTP, University of Cambridge, UK.

October 2009 *Invited colloquium*: Bologna Observatory, Italy.

September 2009 *Invited colloquium*: Physics Dept. University of Geneva, Switzerland.

September 2009 *Invited talk*: “Particle Cosmology”, CERN Theory Institute, Geneva, Switzerland.

July 2009 *Invited talk*: “Cosmostats”, Ascona, IT.

June 2009 *Invited talk*: “Fingerprints of the Early Universe”, Aspen, USA.

May 2009 *Invited colloquium*: ICCUB, Barcelona, Spain.

May 2009 *Invited talk*: “CosmoClusters”, Marseille, France.

April 2009: *Invited talk*: “Supernova Progenitors”, Princeton University, Princeton, USA.

March 2009: *Invited talk*: “New Horizons for Modern Cosmology: Dark Energy”, IGG, Florence, Italy.

February 2009: *Invited coordinator*: “New Horizons for Modern Cosmology: Dark Matter”, IGG, Florence, Italy.

November 2008: *Invited colloquium*: University of Pittsburgh, USA.

October 2008: *Invited talk*: “Spectral galaxy classification”, Ringberg Castle, Germany.

October 2008: *Invited seminar*: MPA Garching, Germany.

September 2008: *Invited talk*: “Probing Stellar Populations out to the Distant Universe”, Cefalu, Italy.

August 2008: *Invited talk*: “Modern Cosmology: Early Universe, CMB and LSS”, Benasque, Spain.

July 2008: *Invited talk*: “Santa Fe 2008 Cosmology Workshop”, Santa Fe, USA.

April 2008: *Invited talk*: CosmoTools workshop, Marseille, France.

March 2008: *Invited talk*: “Cosmic microwave background power spectrum estimation and Sunyaev-Zeldovich cluster extraction in light of point source contamination in microwave maps” workshop, SAAO Cape Town, South Africa.

March 2008: *Invited lecture*: “Multiwavelength views of the high redshift universe”, SAAO Cape Town, South Africa.

March 2008: *Invited colloquium*: Dept. of Mathematics, University of KwaZulu-Natal, Durban, South Africa.

March 2008: *Invited colloquium*: APC Paris, France.

January 2008: *Invited talk*: “Cosmology”, Aspen Center for Physics, USA.

January 2008: *Invited colloquium*: NYU Physics Department, USA.

December 2007: *Two invited lectures*: “PAU Academic Training 07”, UAM, Madrid, Spain.

November 2007: *Invited lecture*: “XIX Winter School”, IAC, Canary Islands, Spain.

November 2007: *Invited Colloquium*: Institute of Space Sciences, Barcelona, Spain.

October 2007: *Invited talk*: “Decrypting the Universe”, Edinburgh, UK.

October 2007: *Invited talk*: “Star Formation Through Cosmic Time”, KITP, US.

October 2007: *Invited talk*: “Supernovae: light in the darkness”, Mao, Spain.

August 2007: *Invited talk*: “Star Formation, Then and Now”, KITP, Santa Barbara, USA.

May 2007: *Invited colloquium*. Dept. of Astronomy & Astrophysics, Harvard University, USA.

March 2007: *Invited talk*: “Cosmology: the CMB and Large Scale Structure”, Santiago, Chile.

February 2007: *Invited talk*: “Cosmology with Clusters of Galaxies”, Aspen, USA.

December 2006: *Three invited lectures on galaxy formation and evolution at ASTROCAM*, Madrid, Spain.

December 2006: *Invited talk*: “I Iberian Cosmology Meeting”, Porto, Portugal.  
 October 2006: *Invited colloquium*. Physics Department. Columbia University, USA.  
 September 2006: *Invited Magistral Lecture*. Universidad Menendez Y Pelayo, Santander, Spain.  
 September 2006: *Invited talk*: “Identification of Dark Matter 2006”, Rhodes, Greece.  
 August 2006: *Invited talk*: “Benasque-2006 Cosmology”, Benasque, Spain.  
 July 2006: *Invited talk*: “Non-gaussianity”, SISSA, Trieste, IT.  
 June 2006: *Invited talk*: “From Planets to Cosmology”, Budapest, Hungary.  
 June 2006: *Invited talk*: “Bernard’s Cosmic Stories”, Valencia, Spain.  
 June 2006: *Invited lecture*: “Clusters of Galaxies”, Princeton, USA.  
 May 2006: *Invited colloquium*: Carnegie Observatories, USA.  
 March 2006: *Invited colloquium*: UAM, Madrid, Spain.  
 March 2006: *Invited talk*: “Cosmology and Underground Lab Physics”, Valencia, Spain.  
 January 2006: *Invited talk*: “Cosmological Probes of Baryons and Dark Matter”, Aspen Center for Physics, USA.  
 December 2005: *Invited colloquium*: UAB, Barcelona, Spain.  
 November 2005: *Invited colloquium*: University of Illinois, USA.  
 November 2005: *Invited participation*: “Probing the Dark Universe with Subaru and Gemini”, Hawaii, USA.  
 October 2005: *Invited colloquium*: UC Santa Barbara, USA.  
 October 2005: *Invited colloquium*: Carnegie Observatories, USA.  
 October 2005: *Invited colloquium*: Stanford University, USA.  
 October 2005: *Invited colloquium*: UC San Diego, USA.  
 October 2005: *Invited colloquium*: UC Davies, USA.  
 October 2005: *Invited colloquium*: UC Berkeley, USA.  
 October 2005: *Invited colloquium*: UC Irvine, USA.  
 October 2005: *Invited seminar*: Caltech, USA.  
 July 2005: *Invited seminar*: IoA, Cambridge, UK.  
 May 2005: *Invited talk*: “What is  $\nu$ ?”, Madrid, Spain.  
 April 2005: *Invited seminar*: Fermilab, USA.  
 March 2005: *Invited seminar*: Institute for Astronomy, Edinburgh, UK.  
 March 2005: *Invited seminar*: University of Chicago, USA.  
 February 2005: *Invited talk*: “Princeton/Oxford meeting”, Princeton, USA.  
 December 2004: *Invited talk*: “Radiative transfer and MHD in AMR”, Copenhagen, Denmark.  
 December 2004: *Invited colloquium*: Rome Observatory, Italy.  
 December 2004: *Invited colloquium*: Bologna Physics Department, Italy.  
 December 2004: *Invited colloquium*: UCSB Physics & Astronomy Department, USA.  
 November 2004: *Invited seminar*: RIT Physics Department, USA.  
 October 2004: *Invited seminar*: Syracuse Physics Department, USA.  
 September 2004: *Invited lecture*: “Cosmology School in Asiago”, Italy.  
 July 2004: *Invited talk*: “The quest for cosmological scalar fields”, Porto, Portugal.  
 December 2003: *Invited colloquium*. CIDA, Venezuela.  
 July 2003: *Invited talk*: “Marcel Grossman meeting”, Rio de Janeiro, Brazil.  
 March 2003: *Invited talk*: “Cosmology”, Princeton, USA.  
 February 2003: *Invited talk*: “CMBNET”, Oxford, UK.  
 January 2003: *Invited talk*: “The Baryonic Universe”, Aspen, USA.  
 July 2002: *Invited talk*: “Dark Matter small-scale problems”, Chicago, USA.  
 July 2002: *Invited talk*: “Chemical evolution of dwarf galaxies”, Ringberg Castle, Germany.  
 June 2002: *Invited talk*: “Cosmology and structures at high redshifts”, Daejeon, South Korea.  
 November 2001: *Invited talk*: “DIMACS meeting on data mining methods”, New Brunswick, USA.  
 September 2001: *Invited talk*: “Hydrodynamical Simulations of Galaxy Assembly”, Madrid, Spain.  
 May 2001: *Invited talk*: “Chemical enrichment of Intracluster and Intergalactic Medium”, Vulcano, Italy.  
 May 2001: *Invited talk*: “MadridLunes”, Autonomous University of Madrid, Madrid, Spain.  
 September 2000: *Invited talk*: “Biannual meeting of the Spanish Astronomical Society”, Santiago de Compostela, Spain.

May 2000: *Invited talk*: “Optimal methods for extracting information from galaxy spectra”, Porquerolles, France.  
 September 1999: *Invited talk*: “VISTA/NGST”, Edinburgh, UK.  
 April 1999: *Invited talk*: “Spectrophotometric dating of stars and galaxies, Annapolis 99”, Maryland, USA.  
 July 1998: *Invited talk*: “DARK98”, Heidelberg, Germany.  
 April 1998: *Invited seminar*: IoA, University of Cambridge, Cambridge (UK).  
 December 1997: *Invited talk*: “Cosmology: from COBE to Galaxy Formation”, Copenhagen, Denmark.  
 June 1997: *Invited seminar*: University of Padua, Padua, IT.  
 May 1997: *Invited seminar*: Durham University, Durham, UK.  
 March 1997: *Invited talk*: meeting of the National Academy of Science: “The Age of The Universe, Dark Matter and Structure Formation”, Irvine, California, USA.  
 December 1996: *Invited lecture*: “From Quantum Fluctuations to Cosmological Structures”, Casablanca, Morocco.  
 June 1996: *Invited talk*: “Astroparticle Physics”, Uppsala, Sweden.  
 June 1995: *Invited talk*: “The Age of the Universe”, Copenhagen, Denmark.

### **PATENTS**

US patent No: 6,433,710

### **PUBLIC UNDERSTANDING OF SCIENCE**

My research has been featured in several newspapers, among them: The Economist, The New York Times, BBC, The New Scientist, Scientific American, The Daily Telegraph, FORBES magazine, Phys.org, sciencenewstoday.org, Haaretz, El Mundo, El Pais, La Sexta, ETB. I have lectured for amateur astronomers associations both in the USA and Spain.

Invited speaker/coordinator ESOF2008.

Invited speaker “Curso de Verano El Escorial”, UCM, Madrid, July 2009.

Invited talk at “The English International College”, Marbella 7 May 2010, Spain.

Invited talk at “Bull - Extreme Computing”, Barcelona 5 May 2010, Spain.

Invited talk at UC Casa Central, Santiago de Chile, 29 September 2010, Chile.

Invited talk at “The English International College”, Marbella 5 December 2014, Spain.

Invited talk at “Planetario de Madrid”, Madrid 3 December 2015, Spain.

TV appearance at “Science for the Public”, WGBH, Boston 26 January 2016, USA.

Invited appearance at the "Institutio Alfons el Magnanim" public outreach act (<http://www.alfonselmagnanim.net>), Valencia 27 April 2017.

Invited talk at “X Jornades de Relativitat de Terrassa”, Terrassa 6 May 2017, Spain.

Invited article in "Investigación y Ciencia" (Spanish language version of Scientific American), December 2017.

Invited presentation at the Tabakalera in Donostia for the research project "Spectral Exchange" (<http://www.spectral.exchange>), December 2018.

Invited presentation at the "Institutio Alfons el Magnanim" public outreach act (<https://www.youtube.com/watch?v=pnt4-nbXgmU>), Valencia, February 2020.

External consultant to the British School of Barcelona to advise year 12-13 STEM pupils (British Curriculum) on University entrance. 2017–2025.

Interview at "Quantum Photonics", clubhouse podcast. August 2025.

Public talk at “Associación Astronómica de Sabadell”. November 2025.

Featured at Scientific Sense podcast [https://open.spotify.com/episode/2ALzG1jJhgawrz01Mbe7aL?si=EldQukMir8GBtVEZgu\\_OdA](https://open.spotify.com/episode/2ALzG1jJhgawrz01Mbe7aL?si=EldQukMir8GBtVEZgu_OdA) 2026.

### **LANGUAGES**

Spanish: mother tongue

English: fluent

Italian: fluent

French: basic

## **SOFTWARE**

I have developed the following astrophysical software packages:

*DENARIO*: Deep Knowledge AI Agents for Scientific Discovery. <https://astropilot-ai.github.io/DenarioPaperPage/>

*PHOTO-Z TOOLS*: New spectral templates and GALEX+SDSS catalog. [icc.ub.edu/~jimenez/PHOTOZ](http://icc.ub.edu/~jimenez/PHOTOZ)

*CMBWARP*: fast cosmological parameter estimation tools. [icc.ub.edu/~jimenez/CMBwarp](http://icc.ub.edu/~jimenez/CMBwarp)

*SPEED*: synthetic stellar populations and stellar evolution code. [icc.ub.edu/~jimenez/SPEED](http://icc.ub.edu/~jimenez/SPEED)

*VESPA+MOPED*: physical extraction of parameters from stellar spectra and photometry. [www-wfau.roe.ac.uk/vespa](http://www-wfau.roe.ac.uk/vespa)

## SCIENTIFIC ACHIEVEMENTS

The list below summarizes the main findings about Nature I have made during my scientific career. The number in parenthesis corresponds to the article number in the publication list:

**The Age of the Universe and Cosmological Parameters:** The first accurate and precise constraint on the age of the Universe using globular clusters (13.5 Gyr, published in 1995); among the first indications for a cosmological constant using the ages of high- $z$  galaxies and the ages of globular clusters (4, 7, 8, 12, 17). The first reliable and accurate estimate of the ages of high- $z$  galaxies (6, 15, 18). The first accurate constraints on the age of Milky Way disk (20). A new method to directly measure the expansion history of the metric of space time via cosmic chronometers: the cosmic chronometer method (39, 59). I was the first one to introduce the term "tension" and quantify it regarding the mismatch at high and low-redshift of the  $H_0$  (137, 140, 148). A demonstration of the accuracy of the cosmic chronometer method to compute cosmology parameters (158, 159, 171, 177). A new precise and accurate measurement of the age of the universe at the % level (173, 183, 187, 205, 206, 207). A method to measure  $H_0$  from neutrino oscillations (196). A model to explain how minuscule black holes formed during inflation that produce gravitons can remove the Hubble tension (202). I have extended the age-dating technique to local and high-redshift globular clusters (210, 212, 214, 222).

**Stellar Populations:** The solution of the long standing inverse problem of deriving physical quantities from the integrated light of stellar populations via the MOPED and VESPA algorithms (34, 76). The determination of the ages, metallicities and star formation histories of galaxies from their integrated spectrum using MOPED and VESPA (53, 56, 57, 74, 86).

**Stars and the Interstellar Medium:** An accurate measurement of the primordial He abundance (46, 78). The first theoretical prediction that the magnetic field in molecular clouds is low (52). The discovery of the nature of Supernova type-Ia progenitors (87, 103). The role of GRBs in life survival in the universe; a lower bound to the value of the cosmological constant (155). A quantitative demonstration of the effect that giant planets can have in biasing the cosmic ladder (182).

**Galaxy Formation and Evolution:** Among the first parameter-free models for the formation of GCs in the LCDM paradigm (13, 153). The prediction, and later confirmation, of the existence of dark galaxies (16, 40, 178). The prediction of the existence of high- $z$  ( $z > 3$ ) massive elliptical galaxies (24). The observational demonstration of the existence of primordial gas at low redshift ( $z \sim 3$ ) (64). How to perform tomography of the re-ionization epoch (69, 72, 79). A theoretical model for the formation of the first galaxies (141, 143). The theoretical discovery of how galaxies obtain their spin in the hierarchical model of structure via the cosmic web (152). The finding that there are no missing low-mass galaxies in a cosmological volume of  $1 \text{ Gpc}^3$  (169).

**Large Scale Structure:** The first accurate analytical calculation of the non-gaussian mass function of collapsed structures (27). The first hints from the abundance of rare objects of primordial non-gaussian fluctuations (96). The development of analytic methods to compute the large scale structure of the universe (104, 115, 138,144). The development of accurate and exact tools to analyze weak lensing cosmological studies (154, 157, 166). A method to measure in a cosmology-model independent way the standard ruler of the Universe (162).

**Neutrino Cosmology:** The measurement of neutrino masses and their hierarchy from cosmology (97, 127, 161, 163, 165). A new method to distinguish Dirac from Majorana neutrinos using astronomical observations (197, 207) and new predictions on the shape of neutrino profiles (209). I have also made the first accurate predictions on how the cross-correlations of the cosmic neutrino background look like (215). I have also developed a novel method to measure the cosmic neutrino background using celestial objects (217).

**Dark Energy Theory:** A dynamical origin to explain the nature of dark energy as a source of momentum exchange with neutrinos (168, 184). Some of the strongest constraints on modifications of gravity, putting these theories under pressure (142, 151, 156, 159, 163, 175, 185).

**Dark Matter:** The first precise computation of annihilation and profile spikeness of dark matter halo profiles (38). A method to detect the existence of axions from astronomical observations (117, 126). A quantitative demonstration that the existence of dwarf galaxies without dark matter implies that dark matter can only be cold CDM (183).

**Early Universe and Theoretical Cosmology (The Quantum Nature of the Universe):** An inflation model from pure (super-)symmetry considerations (101,110, 125). The best model independent constraint on the amount of different types of energy densities in the early Universe: no room for early dark energy (164). A method to measure deviations from Einstein gravity at the Planck scale using non-gaussian observations of the CMB (170). A new method to test the early Universe via measurements of the graviton exchange during inflation using the non-gaussian halo power-spectrum (172). A new method to measure the Homogeneity of the Universe for any general metric and independently on the cosmological model: a way to see inside the past light-cone (174). A method to constraint the global curvature of the Universe independent of the cosmology model (167). A new approach based entirely on quantum mechanics to describe the early Universe, including a robust prediction that the tensor-to-scalar ratio must be 0.01 (176, 179, 180). A model independent method to describe quasi de Sitter as a pure non-perturbative quantum gravity phenomenon on exact de Sitter as a result of the quantum phases as described by the quantum Fisher (185, 186, 188, 189, 190, 192, 195). A new insight of why the Universe is exactly spacially flat (201). I have also developed a new picture to observationally test the quantum nature of the Universe (216,224) and a new theory in which the scalar perturbations of the Universe is generated from quantum fluctuations of space-time (211,216).

**Statistics and Inference:** The invention of the data compression algorithm MOPED(28) and VESPA(79) . The development of rigorous statistical methods to analyse astronomical observations and reduce the effect of systematic errors (120). A new parameterization of the cosmic microwave background that opened the door to fast cosmological parameter estimation (43). A theoretical method to better design CMB polarization experiments (63).

**Holography, Gravitational Waves and the Early Universe:** I have developed a new approach to study singularities and strongly coupled field theories to understand also phase transitions in the early Universe as well as the state of matter in neutron stars collisions (208).

**Computational methods:** I have developed new algorithms in the field of machine learning to solve differential equations (PINNs). In particular, I have found new schemes to facilitate the search for solutions in NN with ultra-complex morphology that contains multiple maxima/minima and inflection points. This has wide ranging applications in the field of ML (213). I have published a textbook on the subject (4, 5).

**AI, Robotization and Society:** I have written two books on the impact of robotization and AI on society and democracy as well as numerous articles (238-278) on the same subject.

**Complexity:** I have developed new methods to understand complexity, In particular how to characterized the solution space of non-linear PDEs. This is done in the context of both astrophysical phenomena, game theory and language models. In particular: a new method to analyze and classify the solutions of highly complex PDEs (218) or stochastic partial differential equations (231).

**Multi-Agent LLM/AI inference:** I am an active member of the *Denario* <https://astropilot-ai.github.io/DenarioPaperPage/> project to facilitate automated research in multiple fields. *Denario* is a transformative framework in which AI multi-agent systems become *epistemic actors* embedded within the scientific method.

## **PUBLICATIONS**

There are 60 articles with more than 100 citations (marked with \*\*\*). Note that for many papers the author list is alphabetical.

### **Books**

1. "Democracias Robotizadas". Luis Moreno & Raul Jimenez. Ediciones La Catarata (www.catarata.org), May 2018. ISBN: 978-8490974735. Published in Spanish, English and Italian (www.aracneeditrice.it). All versions available in www.amazon.com.
2. "Behind Closed Doors. Reflections in Pandemic Times (2019-2021)". Luis Moreno & Raul Jimenez. May 2021. ISBN: 979-8509871566. Published in Spanish and English. All versions available in www.amazon.com.
3. "The Sociology of Cosmology". Rabih Zbib & Raul Jimenez. October 2027. World Scientific Publishing.
4. "Solving PDEs and Inverse Problems With AI - With Problems and Solutions Part I". Pavlos Protopapas & Raul Jimenez. October 2026. World Scientific Publishing.
5. "Solving PDEs and Inverse Problems With AI - With Problems and Solutions Part II". Pavlos Protopapas & Raul Jimenez. October 2026. World Scientific Publishing.

### **In refereed journals**

6. "Detecting red stellar companions to hot sub-dwarfs with CCD imaging". Peter Thejll, Armin Theissen & Raul Jimenez. *Astronomy & Astrophysics*. **292**, 457-462, 1994.
7. "On globular clusters, mass loss, stellar evolution and the age of the Universe", Raul Jimenez. PhD Thesis. University of Copenhagen, 1995.
8. "Stellar evolution with mass loss – comparison of numerical and semi-analytical computations". Raul Jimenez, Uffe G. Jørgensen, Peter Thejll & James MacDonald. *Monthly Notices of the Royal Astronomical Society*. **275**, 1245-1248, 1995.
9. \*\*\* "A 3.5-Gyr-old galaxy at redshift 1.55". James S. Dunlop, John A. Peacock, Hyron Spinrad, Arjun Dey, Raul Jimenez, Daniel Stern & Roger A. Windhorst. *Nature*. **381**, 581-584, 1996.
10. "A new self-consistency check on the ages of globular clusters". Raul Jimenez & Paolo Padoan. *Astrophysical Journal Letters*. **463**, L17-L20, 1996.
11. \*\*\*\* "Ages of globular clusters; a new approach". Raul Jimenez, Peter Thejll, Uffe Jørgensen, James MacDonald & Bernard Pagel. *Monthly Notices of the Royal Astronomical Society*. **282**, 926-942, 1996.
12. "Stellar evolutionary tracks for low mass stars". Raul Jimenez & James MacDonald. *Monthly Notices of the Royal Astronomical Society*. **283**, 721-732, 1996.
13. "Modified Cold Dark-Matter models in light of 53W091, an old galaxy at high  $z$ ". Alexander Kashlinsky & Raul Jimenez. *Astrophysical Journal Letters*. **474**, L81-L84, 1997.
14. "Clusters 1 and 3 in the Fornax dwarf galaxy". Uffe G. Jørgensen & Raul Jimenez. *Astronomy & Astrophysics*. **317**, 54-64, 1997.
15. \*\*\* "Ages of globular clusters: breaking the age-distance degeneracy with the luminosity function". Paolo Padoan & Raul Jimenez. *Astrophysical Journal*. **475**, 580-583, 1997.
16. "On star formation in primordial protoglobular clouds". Paolo Padoan, Raul Jimenez & Bernard Jones. *Monthly Notices of the Royal Astronomical Society*. **285**, 711-717, 1997.

17. “Are low surface brightness discs young?”. Paolo Padoan, Raul Jimenez & Vincenzo Antonuccio-Delogu. *Astrophysical Journal Letters*. **481**, L27-L30, 1997.
18. \*\*\* “LBDS 53W091: An old, red galaxy at  $z = 1.552$ ”. Hyron Spinrad, Arjun Dey, Daniel Stern, James Dunlop, John Peacock, Raul Jimenez & Rogier Windhorst. *Astrophysical Journal*. **484**, 581-601, 1997.
19. “Dark galaxies, spin bias and gravitational lenses”. Raul Jimenez, Alan Heavens, Mike Hawkins & Paolo Padoan. *Monthly Notices of the Royal Astronomical Society*. **292**, L5-L10, 1997.
20. “The ages and distances of globular clusters with the luminosity function method: the Case of M5 and M55”. Raul Jimenez & Paolo Padoan. *Astrophysical Journal*. **498**, 704-709, 1998.
21. “Old high-redshift galaxies and primordial density fluctuation spectra”. John Peacock, Raul Jimenez, James Dunlop, Ian Waddington, Hyron Spinrad, Daniel Stevens, Arjun Dey & Rogier Windhorst. *Monthly Notices of the Royal Astronomical Society*. **296**, 1089-1097, 1998.
22. \*\*\*“Galaxy formation and evolution: low surface brightness galaxies”, Raul Jimenez, Paolo Padoan, Francesca Matteucci & Alan Heavens. *Monthly Notices of the Royal Astronomical Society*. **299**, 123, 1998.
23. “Hipparcos and the age of the galactic disc”. Raul Jimenez, Chris Flynn & Eira Kotoneva. *Monthly Notices of the Royal Astronomical Society*. **299**, 515-519, 1998.
24. “Galaxy evolution, deep galaxy counts and the near-IR cosmic infrared background”. Raul Jimenez & Alexander Kashlinsky. *Astrophysical Journal*. **511**, 16-33, 1999.
25. “On the origin of damped Lyman-alpha systems: a case for LSB galaxies?”. Raul Jimenez, David Bowen & Francesca Matteucci. *Astrophysical Journal Letters*. **514**, 83-86, 1999.
26. “The role of star formation in the Tully-Fisher law”. Alan Heavens & Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **305**, 770-774, 1999.
27. “Premature dismissal of high redshift elliptical galaxies”. Raul Jimenez, Amancio Friaca, James Dunlop, Roberto Terlevich, John Peacock & Louisa Nolan. *Monthly Notices of the Royal Astronomical Society*. **305**, L16-L20, 1999.
28. “Overmerging and M/L ratios in phenomenological galaxy formation models”. Eelco van Kampen, Raul Jimenez & John Peacock. *Monthly Notices of the Royal Astronomical Society*. **310**, 43-56, 1999.
29. “Proto-galactic starbursts at high redshift”. Raul Jimenez, Paolo Padoan, James S. Dunlop, David V. Bowen, Mika Juvela & Francesca Matteucci. *Astrophysical Journal*. **532**, 152-169, 2000.
30. \*\*\*“The abundance of high-redshift objects as a probe of non-Gaussian initial conditions”. Sabino Matarrese, Licia Verde & Raul Jimenez. *Astrophysical Journal*. **541**, 10-24, 2000.
31. \*\*\*“Massive lossless data compression and multiple parameter estimation from galaxy spectra”. Alan Heavens, Raul Jimenez & Ofer Lahav. *Monthly Notices of the Royal Astronomical Society*. **317**, 965-972, 2000.
32. “Where are the absorbers towards Q2302+029?”. David Bowen, Raul Jimenez & Max Pettini. *Astrophysical Journal*. **547**, 39-49, 2001.
33. “Galactosynthesis: halo histories, star formation, and disks”. Ari Buchalter, Raul Jimenez & Marc Kamionkowski. *Monthly Notices of the Royal Astronomical Society*. **322**, 43-66, 2001.
34. “The Sun, stellar-population models, and the age estimation of high-redshift galaxies”. Louisa Nolan, James Dunlop & Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **323**, 385-390, 2001.
35. \*\*\*“The ages of quasar host galaxies”. Louisa Nolan, James Dunlop, Marek Kukula, Dave Hughes, Todd Boroson & Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **323**, 308-330, 2001.

36. \*\*\*\*“Tests for primordial non-Gaussianity”. Licia Verde, Raul Jimenez, Marc Kamionkowski & Sabino Matarrese. *Monthly Notices of the Royal Astronomical Society*. **325**, 412-418, 2001.
37. \*\*\*\*“Recovering physical parameters from galaxy spectra using MOPED”. Christian Reichardt, Raul Jimenez & Alan F. Heavens. *Monthly Notices of the Royal Astronomical Society*. **327**, 849-867, 2001.
38. “The origin of blue cores in Hubble Deep Fields E/S0 galaxies”. Felipe Menanteau, Raul Jimenez & Francesca Matteucci. *Astrophysical Journal Letters*. **562**, L23-L27, 2001.
39. “Energetics of gamma-ray bursts”. Raul Jimenez, David Band & Tsvi Piran. *Astrophysical Journal*. **561**, 171-177, 2001.
40. “Galactosynthesis at high-redshift”. Ari Buchalter, Raul Jimenez & Marc Kamionkowski. *Monthly Notices of the Royal Astronomical Society*. **328**, 520-526, 2001.
41. \*\*\*\*“Dark matter spikes and annihilation from the galactic center”. David Merritt, Milos Milosavljevic, Licia Verde & Raul Jimenez. *Physical Review Letters*. **88**, 191301, 2002.
42. \*\*\*\*“Constraining cosmological parameters based on relative galaxy ages”. Raul Jimenez & Abraham Loeb. *Astrophysical Journal*. **573**, 37-42, 2002.
43. “The abundance of dark galaxies”. Licia Verde, Siang-Peng Oh & Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **336**, 541, 2002.
44. “Coupled spheroid and black-hole formation, and the multifrequency detectability of AGN and sub-mm sources”. Elese Archibald, James S. Dunlop, Raul Jimenez, Amancio Friaca, Ross J. McLure & David H. Hughes. *Monthly Notices of the Royal Astronomical Society*. **336**, 353, 2002.
45. “Luminosity-metallicity relation for the lower main-sequence”. Eira Kotoneva, Chris Flynn & Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **335**, 1147-1159, 2002.
46. \*\*\*\*“Efficient cosmological parameter estimation from microwave background anisotropies”. Arthur Kosowsky, Milos Milosavljevic & Raul Jimenez. *Physical Review D*. **66**, 063007, 2002.
47. “Old elliptical galaxies at  $z \sim 1.5$  and the Kormendy relation”. I. Waddington, R. A. Windhorst, S. H. Cohen, J. S. Dunlop, J. A. Peacock, Raul Jimenez, R. J. McLure, A. J. Bunker, H. Spinrad, A. Dey & D. Stern. *Monthly Notices of the Royal Astronomical Society*. **336**, 1342, 2002.
48. \*\*\*\*“Dark halo properties from rotation curves”. Raul Jimenez, Licia Verde & Siang-Peng Oh. *Monthly Notices of the Royal Astronomical Society*. **339**, 243, 2003.
49. \*\*\*\*“The cosmic production of helium”. Raul Jimenez, Chris Flynn, James MacDonald & Brad K. Gibson. *Science*. **299**, 1552, 2003.
50. “F stars, metallicity and the ages of red galaxies at  $z > 1$ ”. Louisa A. Nolan, James S. Dunlop, Raul Jimenez & Alan F. Heavens. *Monthly Notices of the Royal Astronomical Society*. **341**, 464, 2003.
51. “Photoelectric heating and [CII] cooling in translucent clouds: results for cloud models based on simulations of compressible MHD turbulence”. Mika Juvela, Paolo Padoan, Raul Jimenez. *Astrophysical Journal*. **591**, 258, 2003.
52. \*\*\*\*“Constraints on the equation of state of dark energy and the Hubble constant from stellar ages and the cosmic microwave background”. Raul Jimenez, Licia Verde, Tommaso Treu & Dan Stern. *Astrophysical Journal*. **593**, 622, 2003.
53. \*\*\*\*“Star formation and metallicity history of the SDSS galaxy survey: unlocking the fossil record”. Benjamin Panter, Alan F. Heavens & Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **343**, 1145, 2003.

54. \*\*\*"Synthetic stellar populations: single stellar populations, stellar interior models and primordial proto-galaxies". Raul Jimenez, James MacDonald, James Dunlop, Paolo Padoan & John Peacock. *Monthly Notices of the Royal Astronomical Society*. **349**, 240, 2004.
55. \*\*\*"The average magnetic field in molecular clouds: new evidence of super-alfvenic turbulence". Paolo Padoan, Raul Jimenez, Mika Juvela & Åke Nordlund. *Astrophysical Journal Letters*. **604**, 49, 2004.
56. \*\*\* "The star-formation history of the Universe from the stellar populations of nearby galaxies". Alan Heavens, Benjamin Panter, Raul Jimenez & James Dunlop. *Nature*. **428**, 625, 2004.
57. "Structure functions scaling in compressible super-alfvenic MHD turbulence". Paolo Padoan, Raul Jimenez, Åke Nordlund & Stanislav Boldyrev. *Physical Review Letters*. **92**, 191102, 2004.
58. "Fast cosmological parameter estimation from microwave background temperature and polarization power spectra". Raul Jimenez, Licia Verde, Hiranya Peiris & Arthur Kosowsky. *Physical Review D*. **70**, 023005, 2004.
59. \*\*\*"The mass function of the stellar component of galaxies in the Sloan Digital Sky Survey". Ben Panter, Alan F. Heavens & Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **355**, 764, 2004.
60. "Baryonic Conversion Tree: the global assembly of stars and dark matter in galaxies from the SDSS". Raul Jimenez, Benjamin Panter, Alan Heavens & Licia Verde. *Monthly Notices of the Royal Astronomical Society*. **356**, 495, 2005.
61. "Limits on deviations from the inverse-square law on megaparsec scales". Carolyn Sealfon, Licia Verde & Raul Jimenez. *Physical Review D*. **71**, 083004, 2005.
62. \*\*\*"Constraints on the redshift dependence of the dark energy potential". Joan Simon, Licia Verde, Raul Jimenez. *Physical Review D*. **71**, 123001, 2005.
63. "Fast identification of transits from light curves". Pavlos Protopapas, Raul Jimenez & Charles Alcock. *Monthly Notices of the Royal Astronomical Society*. **362**, 460, 2005.
64. \*\*\*"The SCUBA Half-Degree Extragalactic Survey - I. Survey motivation, design and data processing". Mortier et al. *Monthly Notices of the Royal Astronomical Society*. **363**, 563, 2005.
65. "Smoothing spline primordial power spectrum reconstruction". Carolyn Sealfon, Licia Verde & Raul Jimenez. *Physical Review D*. **72**, 103520, 2005.
66. \*\*\*"Considerations in optimizing CMB polarization experiments to constrain inflationary physics". Licia Verde, Hiranya Peiris & Raul Jimenez. *JCAP*. **JCAP01(2006)019**.
67. \*\*\*"Significant primordial star formation at redshifts  $z \approx 3 - 4$ ". Raul Jimenez & Zoltan Haiman. *Nature*. **440**, 501, 2006.
68. "Correlation properties of the Kinematic Sunyaev-Zel'dovich effect and implications for dark energy". Carlos Hernandez-Monteagudo, Licia Verde, Raul Jimenez & David Spergel. *Astrophysical Journal*. **643**, 598, 2006.
69. "Stacking weak lensing signals of SZ clusters to constrain cluster physics". Carolyn Sealfon, Licia Verde & Raul Jimenez. *Astrophysical Journal*. **649**, 118, 2006.
70. "Environment and the Cosmic Evolution of Star Formation". Ravi K. Sheth, Raul Jimenez, Ben Panter, Alan Heavens. *Astrophysical Journal Letters*. **650**, L25, 2006.
71. "The thermal Sunyaev-Zeldovich signature of baryons in the local universe". Carlos Hernandez-Monteagudo, Hy Trac, Raul Jimenez & Licia Verde. *Astrophysical Journal Letters*. **652**, L1, 2006.
72. "Tomography of the reionization epoch with multi-frequency CMB observations". Carlos Hernandez-Monteagudo, Licia Verde & Raul Jimenez. *The Astrophysical Journal*. **653**, 1, 2006.

73. "The star formation histories of elliptical galaxies across the fundamental plane". Louisa Nolan, James Dunlop, Ben Panter, Raul Jimenez, Alan Heavens & G. Smith. *Monthly Notices of the Royal Astronomical Society*. **375**, 371, 2007.
74. "Reconstructing the cosmic evolution of quasars from the age distribution of local early-type galaxies". Zoltan Haiman, Raul Jimenez & Mariangela Bernardi. *The Astrophysical Journal*. **658**, 721, 2007.
75. "Pumping oxygen: mapping the reionization epoch with the CMB". Carlos Hernandez-Monteagudo, Zoltan Haiman, Raul Jimenez & Licia Verde. *The Astrophysical Journal Letters*. **660**, L85, 2007.
76. "Model atmospheres for irradiated giant stars: implications for the galactic center". Raul Jimenez, Juliana P. da Silva, Peng Oh, Uffe Jorgensen & David Merritt. *The Astrophysical Journal*. **661**, 203, 2007.
77. \*\*\*"The star formation histories of galaxies in the Sloan Digital Sky Survey". Ben Panter, Raul Jimenez, Alan Heavens & Stephane Charlot. *Monthly Notices of the Royal Astronomical Society*. **378**, 1550, 2007.
78. \*\*\* "The ages, metallicities and star formation histories of early-type galaxies in SDSS". Raul Jimenez, Mariangela Bernardi, Zoltan Haiman, Ben Panter, Alan Heavens. *The Astrophysical Journal*. **669**, 947, 2007.
79. \*\*\*"Recovering star formation and metallicity histories from spectra using VESPA". Rita Tojeiro, Alan F. Heavens, Raul Jimenez & Ben Panter. *Monthly Notices of the Royal Astronomical Society*. **381**, 1252, 2007.
80. "The kinetic Sunyaev-Zeldovich effect due to the electrons in our galaxy". Amir Hajian, Carlos Hernandez-Monteagudo, Raul Jimenez, David Spergel & Licia Verde. *The Astrophysical Journal*. **671**, 1079, 2007.
81. \*\*\*"The Helium abundance and  $\Delta Y/\Delta Z$  in lower main sequence stars". Luca Casagrande, Chris Flynn, Laura Portinari, Leo Girardi & Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **382**, 1516, 2007.
82. "Oxygen pumping II: probing the in-homogeneous metal enrichment at re-ionization with high frequency cmb observations". Carlos Hernandez-Monteagudo, Zoltan Haiman, Licia Verde & Raul Jimenez. *The Astrophysical Journal*. **672**, 33, 2008.
83. "The cosmic neutrino background and the age of the Universe". Francesco de Bernardis, Alessandro Melchiorri, Licia Verde, Raul Jimenez. *JCAP*. **JCAP03(2008)020**.
84. "Topology from Cosmology". Vijay Balasubramanian, Per Berglund, Raul Jimenez, Joan Simon, Licia Verde. *JHEP*. **JHEP06(2008)025**.
85. "Evidence for Progressive Loss of star forming gas in SDSS galaxies". Francesco Calura, Raul Jimenez, Ben Panter, Francesca Matteucci & Alan Heavens. *The Astrophysical Journal*. **682**, 252, 2008.
86. "The scale dependence of mass assembly in galaxies". Abilio Mateus, Raul Jimenez & Enrique Gaztanaga. *The Astrophysical Journal Letters*. **648**, 61.
87. "Revisiting the effect of H<sub>2</sub>, HD and LiH molecules in the cooling of primordial gas". Joaquin P. Prieto, Leopoldo Infante, Raul Jimenez. eprint arXiv: 0809.2786, 2008.
88. "The Improvement on cosmological parameters with H(z) measurements". Daniel Figueroa, Licia Verde & Raul Jimenez. *JCAP*. **JCAP10(2008)038**.
89. "The role of spin in galaxy formation and evolution". Zachory Berta, Raul Jimenez, Alan F. Heavens & Ben Panter. *Monthly Notices of the Royal Astronomical Society*. **391**, 197, 2008.
90. \*\*\*"The cosmic evolution of metallicity from SDSS fossil record". Ben Panter, Raul Jimenez, Alan Heavens & Stephane Charlot. *Monthly Notices of the Royal Astronomical Society*. **391**, 1117, 2008.
91. "Evidence for short-lived SNIA progenitors". Eric Aubourg, Rita Tojeiro, Raul Jimenez, Alan Heavens, Michael Strauss & David Spergel. *Astronomy & Astrophysics*. **492**, 631, 2008.

92. "Improved photometric redshifts using GALEX for the SDSS stripe 82 and the next generation of SZ surveys". Michael Niemack, Raul Jimenez, Licia Verde, Felipe Menanteau, Ben Panter, David Spergel. *The Astrophysical Journal*. **690**, 89, 2009.
93. "Southern Cosmology Survey III: QSO's from Combined GALEX and Optical Photometry". Raul Jimenez et al. *The Astrophysical Journal Supplement Series*. **181**, 439, 2009.
94. "The Void Abundance with Non-Gaussian Primordial Perturbations". Marc Kamionkowski, Licia Verde & Raul Jimenez. *JCAP*. **JCAP01(2009)010**.
95. "Powering AGNs with super-critical black holes". Anastasios Avgoustidis, Raul Jimenez, Luis Alvarez-Gaume, Miguel A. Vazquez-Mozo. eprint arXiv:0905.2109, 2009.
96. "Photo-z optimization for measurements of the BAO radial direction". Daniel Roig, Licia Verde, Jordi Miralda-Escude, Raul Jimenez, Carlos Pena-Garay. *JCAP*. **JCAP04(2009)008**.
97. "Southern Cosmology Survey I: optical cluster detections and detections for the southern common-area millimeter-wave experiments". Felipe Menanteau, John P. Hughes, Raul Jimenez, Carlos Hernandez-Monteagudo, Licia Verde, Arthur Kosowsky, Kavilan Moodley, Nathan Roche. *The Astrophysical Journal*. **698**, 1221, 2009.
98. \*\*\*\*"Consistency among distance measurements: transparency, BAO scale and accelerated expansion". Anastasios Avgoustidis, Licia Verde, Raul Jimenez. *JCAP*. **JCAP06(2009)012**.
99. "First lensing measurements of SZ-detected clusters". Rachel McInnes et al. *Monthly Notices of the Royal Astronomical Society*. **399**, 84, 2009.
100. \*\*\*\*"A public catalog of stellar masses, star formation and metallicity histories and dust content from the SDSS using VESPA". Rita Tojeiro, Stephen Wilkins, Alan F. Heavens, Ben Panter, Raul Jimenez. *The Astrophysical Journal Supplement Series*. **185**, 1, 2009.
101. "Implications for Primordial Non-Gaussianity ( $f_{NL}$ ) from weak lensing masses of high-z galaxy clusters". Raul Jimenez & Licia Verde. *Physical Review D*. **80**, 127302, 2009.
102. \*\*\*\*"Robust neutrino constraints by combining low redshift observations with the CMB". Beth Reid, Licia Verde, Raul Jimenez, Olga Mena. *JCAP*. **JCAP01(2010)003**.
103. \*\*\*\*"Cosmic Chronometers: Constraining the Equation of State of dark Energy. I:  $H(z)$  measurements". Dan Stern, Raul Jimenez, Licia Verde, Marc Kamionkowski, S. Adam Stanford. *JCAP*. **JCAP02(2010)008**.
104. "Galaxy Zoo: A correlation between coherence of galaxy spin chirality and star formation efficiency". Raul Jimenez et al. *Monthly Notices of the Royal Astronomical Society*. **404**, 975, 2010.
105. \*\*\*\*"Cosmic Chronometers: Constraining the Equation of State of Dark Energy. II. A Spectroscopic Catalog of Red Galaxies in Galaxy Clusters". Dan Stern, Raul Jimenez, Licia Verde, S. Adam Stanford, Marc Kamionkowski. *The Astrophysical Journal Supplement Series*. **188**, 280, 2010.
106. \*\*\*\*"Minimal Inflation". Luis Alvarez-Gaume, Cesar Gomez, Raul Jimenez. *Physics Letters B*. **690**, 68, 2010.
107. \*\*\*\*"Can we measure the neutrino mass hierarchy in the sky". Raul Jimenez, Thomas Kitching, Carlos Pena-Garay, Licia Verde. *JCAP*. **JCAP05(2010)035**.
108. \*\*\*\*"The ages of type Ia Supernova Progenitors". Timothy Brandt, Rita Tojeiro, Eric Aubourg, Alan Heavens, Raul Jimenez, Michael Strauss. *The Astronomical Journal*. **140**, 804, 2010.
109. "Reducing sample variance: halo biasing, non-linearity and stochasticity". Hector Gil-Marin, Christian Wagner, Licia Verde, Raul Jimenez, Alan F. Heavens. *Monthly Notices of the Royal Astronomical Society*. **407**, 772, 2010.

110. \*\*\*\*"Coupled dark matter-dark energy in light of near universe observations", Laura Lopez-Honorez, Beth Reid, Olga Mena, Licia Verde, Raul Jimenez. *JCAP*. **JCAP09(2010)029**.
111. \*\*\*\*"The Atacama Cosmology Telescope: a preliminary measurement of the  $600 < l < 8000$  cosmic microwave background power spectrum at 148 GHz". Joseph Fowler et al. *The Astrophysical Journal*. **722**, 1148, 2010.
112. \*\*\*\*"Constraints on cosmic opacity and beyond the standard model physics from cosmological distance measurements". Anastasios Avgoustidis, Clare Burrage, Javier Redondo, Licia Verde, Raul Jimenez. *JCAP*. **JCAP10(2010)024**.
113. \*\*\*\*"The Atacama Cosmology Telescope (ACT): Beam profile and first SZ cluster maps". A. Hincks et al. *The Astrophysical Journal Supplement Series*. **191**, 423, 2010.
114. "Southern Cosmology Survey II: massive optically-selected clusters from 70 square-degrees of the SZE common area survey". Felipe Menanteau et al. *The Astrophysical Journal Supplement Series*. **191**, 340, 2010.
115. "A Minimal Inflation Scenario", Luis Alvarez-Gaume, Cesar Gomez, Raul Jimenez. *JCAP*. **JCAP03(2011)027**
116. "Constraining the expansion rate of the universe using low-redshift ellipticals as cosmic chronometers", Michele Moresco, Raul Jimenez, Andrea Cimatti, Lucia Pozzetti. *JCAP*. **JCAP03(2011)045**
117. "Pop. III stars from turbulent fragmentation at redshift  $\sim 11$ ", Joaquin Prieto, Paolo Padoan, Raul Jimenez, Leopoldo Infante. *The Astrophysical Journal Letters*. **731**, L38, 2011.
118. "The stellar evolution of Luminous Red Galaxies, and its dependence on colour, redshift, luminosity and modelling", Rita Tojeiro, Will Percival, Alan F. Heavens, Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **413**, 434, 2011.
119. "Implications of multiple high-redshift galaxy clusters", Ben Hoyle, Raul Jimenez, Licia Verde. *PRD*. **83**, 103502, 2011.
120. "A halo model with environmental dependence: theoretical considerations", Hector Gil-Marin, Raul Jimenez, Licia Verde. *Monthly Notices of the Royal Astronomical Society*. **414**, 1207, 2011.
121. "Does stellar mass assembly history vary with environment?", Ben Hoyle, Raul Jimenez, Licia Verde. *Monthly Notices of the Royal Astronomical Society*. **415**, 2818, 2011.
122. "Is it possible to explore Peccei-Quinn axions from frequency dependence radiation dimming?", Raul Jimenez, Carlos Pena-Garay, Licia Verde. *Physics Letters B*. **703**, 232, 2011.
123. "Testing homogeneity with the fossil record of galaxies", Alan F. Heavens, Raul Jimenez, Roy Maartens. *JCAP*. **JCAP09(2011)035**.
124. "The bispectrum of  $f(R)$  cosmologies", Hector Gil-Marin, Fabian Schmidt, Wayne Hu, Raul Jimenez, Licia Verde. *JCAP*. **JCAP11(2011)019**.
125. "Cancelling out systematic uncertainties", Jorge Noreña, Licia Verde, Raul Jimenez, Carlos Pena-Garay, Cesar Gomez. *Monthly Notices of the Royal Astronomical Society*. **419**, 1040, 2012.
126. "Dark matter merging induced turbulence as an efficient engine for gas cooling", Joaquin Prieto, Raul Jimenez, Jose Marti. *Monthly Notices of the Royal Astronomical Society*. **419**, 3092, 2012.
127. "A critical analysis of high-redshift, massive, X-ray selected galaxy clusters: I", Ben Hoyle, Raul Jimenez, Licia Verde, Shaun Hotchkiss. *JCAP*. **JCAP02(2012)009**.
128. \*\*\*\*"An improved fitting formula for the dark matter bispectrum", Hector Gil-Marin, Christian Wagner, Frantzesca Frangkoudi, Raul Jimenez, Licia Verde. *JCAP*. **JCAP02(2012)047**.

129. "The effective Lagrangian of dark energy from observations", Raul Jimenez, P. Talavera, Licia Verde, Michele Moresco, Andrea Cimatti, Lucia Pozzetti. *JCAP*. **JCAP03(2012)014**.
130. "Phenomenology of the Minimal Inflation Scenario", Luis Alvarez-Gaume, Cesar Gomez, Raul Jimenez. *JCAP*. **JCAP03(2012)017**.
131. "Signatures of photon-axion conversion on the thermal spectra and polarization of neutron stars", Rosalba Perna, Wynn Ho, Licia Verde, Matt van Adelberg, Raul Jimenez. *The Astrophysical Journal*. **748**, 116, 2012.
132. "Effects of the neutrino mass splitting on the non-linear matter power spectrum", Christian Wagner, Licia Verde, Raul Jimenez. *The Astrophysical Journal Letters*. **752**, 31, 2012.
133. "The fraction of early-type galaxies in low redshift groups and clusters of galaxies", Ben Hoyle, Robert C. Nichol, Karen L. Masters, Raul Jimenez, Steven P. Bamford. *Monthly Notices of the Royal Astronomical Society*. **423**, 3478, 2012.
134. \*\*\*"New constraints on cosmological parameters and neutrino properties using the expansion rate of the Universe to  $z \sim 1.75$ ", Michele Moresco, Licia Verde, Lucia Pozzetti, Raul Jimenez, Andrea Cimatti. *JCAP*. **JCAP07(2012)053**
135. \*\*\*"Improved constraints on the expansion rate of the Universe up to  $z \sim 1.1$  from the spectroscopic evolution of cosmic chronometers", Michele Moresco et al. *JCAP*. **JCAP08(2012)006**
136. "Gravitational shocks as a key ingredient of Gamma-Ray Bursts". Anastasios Avgoustidis, Raul Jimenez, Luis Alvarez-Gaume, Miguel A. Vazquez-Mozo. *Int. J. Mod. Phys. A*. **27**, 20, 1250110, 2012.
137. "Perturbation theory approach for the power spectrum: from dark matter in real space to haloes in redshift space". Hector Gil-Marin, Christian Wagner, Licia Verde, Cristiano Porciani, Raul Jimenez. *JCAP*. **JCAP11(2012)029**.
138. "An effective theory of accelerated expansion", Raul Jimenez, P. Talavera, Licia Verde. *Int. J. Mod. Phys. A*. **27**, 30, 1250174, 2012.
139. "The similar stellar populations of quiescent spiral and elliptical galaxies", Aday Robaina, Ben Hoyle, Anna Gallazzi, Raul Jimenez, Arjen van der Wel, Licia Verde. *Monthly Notices of the Royal Astronomical Society*. **427**, 3006, 2012.
140. "Testing homogeneity with galaxy star formation histories", Ben Hoyle, Rita Tojeiro, Raul Jimenez, Alan Heavens, Chris Clarkson, Roy Maartens. *ApJ Letters*. **762**, L9, 2013.
141. "Testing LTB void models without the cosmic microwave background or large scale structure: new constraints from galaxy ages". Roland de Putter, Licia Verde, Raul Jimenez. *JCAP*. **JCAP02(2013)047**.
142. "The importance of local measurements for cosmology", Licia Verde, Raul Jimenez, Stephen Feeney. *Physics of the Dark Universe*. **2**, 65, 2013.
143. "Multi-variate joint PDF for non-Gaussianities: exact formulation and generic approximations", Licia Verde, Raul Jimenez, Luis Alvarez-Gaume, Alan Heavens, Sabino Matarrese. *JCAP*. **JCAP06(2013)023**
144. "Reconciling the GRB Rate and Star Formation Histories", Raul Jimenez, Tsvi Piran. *The Astrophysical Journal*. **773**, 126, 2013.
145. \*\*\*"Planck and the local universe: quantifying the tension", Licia Verde, Pavlos Protopapas, Raul Jimenez. *Physics of the Dark Universe*. **2**, 166, 2013.
146. "Gas infall into atomic cooling haloes: on the formation of protogalactic discs and supermassive black holes at  $z > 10$ ", Joaquin Prieto, Raul Jimenez, Zoltan Haiman. *Monthly Notices of the Royal Astronomical Society*. **436**, 2301, 2013.
147. "The parameter space of Cubic Galileon models for cosmic acceleration", Emilio Bellini, Raul Jimenez. *Physics of the Dark Universe*. **2**, 179, 2013.

148. "Over-cooled haloes at  $z > 10$ : a route to form low-mass first stars", Joaquin Prieto, Raul Jimenez, Licia Verde. *Monthly Notices of the Royal Astronomical Society*. **437**, 2320, 2014.
149. "The bias of weighted dark matter halos from peak theory", Licia Verde, Raul Jimenez, Fergus Simpson, Luis Alvarez-Gaume, Alan Heavens, Sabino Matarrese. *Monthly Notices of the Royal Astronomical Society*. **443**, 122, 2014.
150. "Mild quasi-local non-Gaussianity as a signature of modified gravity at the inflation energy scale", Nicola Bartolo, Dario Cannone, Raul Jimenez, Sabino Matarrese, Licia Verde. *Physical Review Letters*. **113**, 161303, 2014.
151. \*\*\*"Possible role of gamma ray bursts on life extinction in the Universe", Tsvi Piran, Raul Jimenez. *Physical Review Letters*. **113**, 231102, 2014.
152. \*\*\*"Standard rulers, candles and clocks from the low-redshift Universe", Alan F. Heavens, Raul Jimenez, Licia Verde. *Physical Review Letters*. **113**, 241302, 2014.
153. "The expansion rate of the intermediate Universe in light of Planck", Licia Verde, Pavlos Protopapas, Raul Jimenez. *Physics of the Dark Universe*. **5**, 307, 2014.
154. "The luminosity and stellar mass functions of GRB host galaxies: insight into the metallicity bias", Michele Trenti, Rosalba Perna, Raul Jimenez. *The Astrophysical Journal*. **802**, 103, 2015.
155. \*\*\*"Calibrating the cosmic distance scale ladder: the role of the sound horizon scale and the local expansion rate as distance anchors", Antonio J. Cuesta, Licia Verde, Adam Riess, Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **448**, 3463, 2015.
156. "Signatures of Horndeski gravity on the Dark Matter Bispectrum", Emilio Bellini, Raul Jimenez, Licia Verde. *JCAP*. **JCAP05(2015)057**
157. "The origin of spin in galaxies: clues from simulations of atomic cooling halos", Joaquin Prieto, Raul Jimenez, Zoltan Haiman, Roberto Gonzalez. *Monthly Notices of the Royal Astronomical Society*. **452**, 784, 2015.
158. \*\*\*"The relative and absolute ages of old globular clusters in the  $\Lambda$ CDM framework", Michele Trenti, Paolo Padoan, Raul Jimenez. *The Astrophysical Journal Letters*. **808**, L35, 2015.
159. "Enhancing the Cosmic Shear Power Spectrum", Fergus Simpson, Joachim Harnois-Deraps, Catherine Heymans, Raul Jimenez, Licia Verde. *Monthly Notices of the Royal Astronomical Society*. **456**, 278, 2016.
160. "Cosmic explosions, life in the Universe and the Cosmological Constant", Tsvi Piran, Raul Jimenez, Antonio J. Cuesta, Fergus Simpson, Licia Verde. *Physical Review Letters*. **116**, 081301, 2016.
161. \*\*\*"Constraints on deviations from  $\Lambda$ CDM within Hordenski gravity", Emilio Bellini, Antonio J. Cuesta, Raul Jimenez, Licia Verde. *JCAP*. **JCAP02(2016)053**
162. "Discrepancies between CFHTLenS cosmic shear & Planck: new physics or systematic effects?", Thomas D. Kitching, Licia Verde, Alan F. Heavens, Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **459**, 971, 2016.
163. "A 6% measurement of the Hubble parameter at  $z \sim 0.45$ : direct evidence of the epoch of cosmic re-acceleration", Michele Moresco et al. *JCAP*. **JCAP05(2016)014**
164. "New constraints on the time evolution of dark energy, curvature and neutrino properties from cosmic chronometers in BOSS", Michele Moresco, Raul Jimenez, Licia Verde, Andrea Cimatti, Lucia Pozzetti, Claudia Maraston, Daniel Thomas. *JCAP*. **JCAP12(2016)039**
165. "Relation between halo spin and cosmic web filaments at  $z \sim 3$ ", Roberto E. Gonzalez, Joaquin Prieto, Nelson Padilla, Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **464**, 666, 2017.

166. "Neutrino footprint in Large Scale Structure", Raul Jimenez, Carlos Pena-Garay, Licia Verde. *Physics of the Dark Universe*. **15**, 31, 2017.
167. \*\*\*"The length of the low-redshift standard ruler", Licia Verde, Jose Luis Bernal, Alan F. Heavens, Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **467**, 731, 2017.
168. "Hiding neutrino mass in modified gravity cosmologies", Nicola Bellomo, Emilio Bellini, Bin Hu, Raul Jimenez, Carlos Pena-Garay, Licia Verde. *JCAP*. **JCAP02(2017)043**
169. "Early cosmology constrained", Licia Verde, Emilio Bellini, Cassio Pigozzo, Alan F. Heavens, Raul Jimenez. *JCAP*. **JCAP04(2017)023**
170. "Strong Bayesian Evidence for the Normal Neutrino Hierarchy", Fergus Simpson, Raul Jimenez, Carlos Pena-Garay, Licia Verde. *JCAP*. **JCAP06(2017)029**
171. \*\*\*"The limits of cosmic shear", Thomas Kitching, Justin Alsing, Alan F. Heavens, Raul Jimenez, Jason McEwen, Licia Verde. *Monthly Notices of the Royal Astronomical Society*. **469**, 2737, 2017.
172. "Peering beyond the horizon with standard sirens and redshift drift", Raul Jimenez, Alvise Raccanelli, Licia Verde, Sabino Matarrese. *JCAP*. **JCAP04(2018)002**.
173. "Dark energy from the motions of neutrinos", Fergus Simpson, Raul Jimenez, Carlos Pena-Garay, Licia Verde. *Physics of the Dark Universe*. **20**, 72, 2018.
174. "Implications for the missing low-mass galaxies (satellites) problem from cosmic shear", Raul Jimenez, Licia Verde, Thomas D Kitching. *Monthly Notices of the Royal Astronomical Society Letters*. **479**, L86, 2018.
175. "Supergravity,  $\alpha$ -attractors and primordial non-Gaussianity", Nicola Bartolo, Domenico Matteo Bianco, Raul Jimenez, Sabino Matarrese, Licia Verde. *JCAP*. **JCAP10(2018)017**.
176. \*\*\*"Setting the Stage for Cosmic Chronometers I. Minimizing Frosting with an Optimized Selection of Cosmic Chronometers", Michele Moresco, Raul Jimenez, Licia Verde, Lucia Pozzetti, Andrea Cimatti, Annalisa Citro. *The Astrophysical Journal*. **868**, 84, 2018.
177. "Measuring the energy scale of inflation with large scale structures", Nicola Bellomo, Nicola Bartolo, Raul Jimenez, Sabino Matarrese, Licia Verde. *JCAP*. **JCAP11(2018)043**.
178. \*\*\*"The local and distant Universe: stellar ages and  $H_0$ ", Raul Jimenez, Andrea Cimatti, Licia Verde, Michele Moresco, Benjamin Wandelt. *JCAP*. **JCAP03(2019)043**.
179. "Measuring the homogeneity of the universe using polarization drift", Raul Jimenez, Roy Maartens, Ali Rida Khalifeh, Robert R. Caldwell, Alan F. Heavens, Licia Verde. *JCAP*. **JCAP05(2019)048**.
180. "Can Dark Matter be Geometry? A Case Study with Mimetic Dark Matter", Ali Rida Khalifeh, Nicola Bellomo, Jose Luis Bernal, Raul Jimenez. *Physics of the Dark Universe*. **30**, 100646, 2020.
181. "How Gaussian can the Sky be? Primordial Non-Gaussianity from Quantum Information", Cesar Gomez, Raul Jimenez. *JCAP*. **JCAP07(2020)047**.
182. "Setting the Stage for Cosmic Chronometers II: Impact of Stellar Models Systematics and Full Covariance Matrix", Michele Moresco, Raul Jimenez, Licia Verde, Andrea Cimatti, Lucia Pozzetti. *The Astrophysical Journal*. **898**, 82, 2020.
183. "The distribution of dark galaxies and spin bias", Raul Jimenez, Alan F. Heavens. *Monthly Notices of the Royal Astronomical Society Letters*. **498**, L93, 2020.
184. "Cosmology from Quantum Information", Cesar Gomez, Raul Jimenez. *Physical Review D*. **102**, 063511, 2020.

185. "Dark matter from primordial quantum information", Cesar Gomez, Raul Jimenez. *JCAP*. **JCAP10(2020)004**.
186. "Giants eating giants: Mass loss and giant planets modifying the luminosity of the Tip of the Giant Branch", Raul Jimenez, Uffe G. Jorgensen, Licia Verde. *JCAP*. **JCAP10(2020)027**.
187. "Inferring the Age of the Universe with Globular Clusters", David Valcin, Jose Luis Bernal, Raul Jimenez, Licia Verde, Benjamin Wandelt. *JCAP*. **JCAP12(2020)002**.
188. "Dwarf Galaxies without Dark Matter: constraints on Modified Gravity", Ali Rida Khalifeh, Raul Jimenez. *Monthly Notices of the Royal Astronomical Society*. **501**, 254, 2021.
189. "Spinors and scalars in curved spacetime: neutrino dark energy ( $DE_\nu$ )", Ali Rida Khalifeh, Raul Jimenez. *Physics of the Dark Universe*. **31**, 100777, 2021.
190. \*\*\*"The trouble beyond  $H_0$  and the new cosmic triangles", Jose Luis Bernal, Licia Verde, Raul Jimenez, Marc Kamionkowski, David Valcin, Benjamin D. Wandelt. *Physical Review D*. **103**, 103533, 2021.
191. "The Age of the Universe with Globular Clusters: reducing systematic uncertainties", David Valcin, Jose Luis Bernal, Raul Jimenez, Licia Verde, Benjamin Wandelt. *JCAP*. **JCAP08(2021)017**.
192. "Quantum Fisher Cosmology: Confronting Observations and the Trans-Planckian Problem", Cesar Gomez, Raul Jimenez. *JCAP*. **JCAP09(2021)016**.
193. "Model Independent Prediction of the Spectral Index of Primordial Quantum Fluctuations", Cesar Gomez, Raul Jimenez. *JCAP*. **JCAP10(2021)052**.
194. "The quantum cosmological tilt and the origin of dark matter", Cesar Gomez, Raul Jimenez. *JCAP*. **JCAP10(2021)055**.
195. "Distinguishing Between Dark Energy Models with Neutrino Oscillations", Ali Rida Khalifeh, Raul Jimenez. *Physics of the Dark Universe*. **34**, 100897, 2021.
196. "Breaking the Single Clock Symmetry: measuring single-field inflation non-gaussian features", Daniele Bertacca, Raul Jimenez, Sabino Matarrese, Licia Verde. *Physical Review D*. **105**, 043503, 2022.
197. \*\*\*"Cosmology Intertwined: A Review of the Particle Physics, Astrophysics, and Cosmology Associated with the Cosmological Tensions and Anomalies", Abdala et al. *Journal of High Energy Astrophysics*. **34**, 49, 2022.
198. "The quantum de Sitter root of quasi de Sitter observables", Cesar Gomez, Raul Jimenez. *Physics of the Dark Universe*. **36**, 101035, 2022.
199. "Using Neutrino Oscillations to Measure  $H_0$ ", Ali Rida Khalifeh, Raul Jimenez. *Physics of the Dark Universe*. **37**, 101063, 2022.
200. "Distinguishing Dirac vs. Majorana neutrinos: a cosmological probe", Beatriz Hernandez-Molinero, Raul Jimenez, Carlos Pena-Garay. *JCAP*. **JCAP08(2022)038**
201. "Neutrino Masses and Mass Hierarchy: Evidence for the Normal Hierarchy", Raul Jimenez, Carlos Pena-Garay, Fergus Simpson, Kathleen Short, Licia Verde. *JCAP*. **JCAP09(2022)006**
202. \*\*\*"Unveiling the Universe with Emerging Cosmological Probes", Michele Moresco et al. *Living Reviews in Relativity*. **25**, 6, 2022.
203. "The Quantum Origin of Quasi de Sitter: a Model Independent Quantum Cosmological Tilt", Cesar Gomez, Raul Jimenez. *JCAP*. **JCAP01(2023)036**
204. "Black Holes as "Time Capsules": A Cosmological Graviton Background and the Hubble Tension", Tsvi Piran, Raul Jimenez. *Astronomische Nachrichten*. **344**, e230033, 2023.

205. “Why is zero spatial curvature special?”, Raul Jimenez, Ali Rida Khalifeh, Daniel Litim, Benjamin Wandelt, Sabino Matarrese. *JCAP*. **JCAP09(2023)007**
206. “Cosmic Chronometers with Photometry: a new path to  $H(z)$ ”, Raul Jimenez, Michele Moresco, Licia Verde, Benjamin D. Wandelt. *JCAP*. **JCAP11(2023)047**
207. “Cosmic Background Neutrinos Deflected by Gravity: DEMNUni Simulation Analysis”, Beatriz Hernandez-Molinero, Carmelita Carbone, Raul Jimenez, Carlos Pena-Garay. *JCAP*. **JCAP01(2024)006**
208. “Gravitational Duals from Equations of State”, Yago Bea, Raul Jimenez, David Mateos, Shuheng Liu, Pavlos Protopapas, Pedro Tarancon, Pablo Tejerina. *JHEP*. **JHEP07(2024)087**
209. “Neutrino Halo profiles: HR-DEMNUni simulation analysis”, Beatriz Hernandez-Molinero, Carmelita Carbone, Raul Jimenez, Carlos Pena Garay. *JCAP*. **JCAP09(2024)033**
210. “Globular Clusters as Cosmic Clocks: New Cosmological Hints from their Integrated Light”, Elena Tomasetti, Michele Moresco, Carmela Lardo, Andrea Cimatti, Raul Jimenez. *A&A*. **696**, A98, 2025.
211. “Inflation without an Inflaton”, Daniele Bertacca, Raul Jimenez, Sabino Matarrese, Angelo Ricciardone. *Physical Review R Letters*. **7**, L032010, 2025.
212. “Time to Sparkler: Accurate ages of lensed globular clusters at  $z = 1.4$  with JWST photometry”, Elena Tomasetti, Michele Moresco, Carmela Lardo, Fred Courbin, Raul Jimenez, Licia Verde, Martin Millon, Andrea Cimatti. *A & A*. **699**, A240, 2025.
213. “Efficient PINNs: Multi-Head Unimodular Regularization of the Solutions Space”, Pedro Tarancon, Pablo Tejerina, Raul Jimenez, Pavlos Protopapas. *Nature Communications Physics*. **8**, 335, 2025.
214. “The Age of the Universe with Globular Clusters III: Updated Constraints”, David Valcin, Raul Jimenez, Uros Seljak, Licia Verde. *JCAP*. **JCAP10(2025)030**
215. “Cross-correlations of the Cosmic Neutrino Background: DEMNUni-highres simulation analysis”, Beatriz Hernandez-Molinero, Matteo Calabrese, Carmelita Carbone, Alessandro Greco, Raul Jimenez, Carlos Pena Garay. *JCAP*. **JCAP12(2025)005**
216. “Inflation without an Inflaton II: observational predictions”, Marisol Traforetti, Mariam Abdelaziz, Daniele Bertacca, Raul Jimenez, Sabino Matarrese, Angelo Ricciardone. *Physical Review D*, **113**, 023553, 2026.
217. “Effects of the Cosmic Neutrino Background Capture on Astrophysical Objects”, Beatriz Hernandez-Molinero, Raul Jimenez, Carlos Pena Garay. *JCAP*. **JCAP02(2026)074**.
218. “Learning Embeddings of non-linear PDEs: The Burgers’ Equation”, Pedro Tarancon, Leonid Saredidine, Pavlos Protopapas, Raul Jimenez. **ICLR 2026**, 2026.
219. “CIGaRS I: Combined simulation-based inference from SN Ia and host photometry”, Konstantin Karchev, Roberto Trotta, Raul Jimenez. *Nature Astronomy*, **11**, XXX, 2026.
220. “Chemo-dynamical reconstruction of Milky Way globular cluster progenitors: age-metallicity relations and the universality of multiple stellar populations”, Carmela Lardo, David Valcin, Raul Jimenez. *A&A*, **709**, XXX, 2026.
221. “The Atacama Cosmology Telescope: Constraints on Local Non-Gaussianity from the ACT Cluster Catalog”, Leonid Saredidine et al. Submitted to *JCAP*, arXiv:2602.03917
222. “The DENARIO project: Deep knowledge AI agents for scientific discovery”, Francisco Villaescusa-Navarro et al. Submitted to *PRX-Intelligence*. arXiv:2510.26887
223. “The Age of the Universe with Globular Clusters IV: Multiple Stellar Populations”, David Valcin, Raul Jimenez, Carmela Lardo, Uros Seljak, Licia Verde. Submitted to *JCAP*. arXiv:2603.04872

224. "Inflation without an Inflaton III: non-gaussian signatures", Mariam Abdelaziz, Marisol Traforetti, Daniele Bertacca, Raul Jimenez, Sabino Matarrese, Angelo Ricciardone. Submitted to *Physical Review D*, arXiv:2603.15036
225. "A Bell Experiment in an Entangled Universe", Pablo Tejerina, Daniele Bertacca, Raul Jimenez, Leonid Srieddine. Submitted to *JCAP*. arXiv:2603.25879
226. "A Bell experiment during inflation: probing quantum entanglement in tensor fluctuations through correlations of primordial scalar curvature perturbations", Pablo Tejerina-Pérez, Leonid Srieddine, Daniele Bertacca, Raul Jimenez. Submitted to *JCAP*. arXiv:2603.25881
227. "AI-Assisted Exploration of DHOST Theory without Quantum Ghosts", Ginevra Braga, Raul Jimenez, Sabino Matarrese. Submitted to *JCAP*. arXiv:2604.16531
228. "Learning embeddings of PDE solutions", Raul Jimenez et al. To be submitted to *Journal of Computational Physics*. arXiv:2604.xxxx
229. "Towards Solving the False Vacuum of Strongly Coupled Field Theories", Raul Jimenez, David Mateos, Pavlos Protopapas, Pau Sole-Vilaro, Pedro Tarancon, Pablo Tejerina-Perez. To be submitted to *JHEP*. arXiv:2604.xxxx
230. "A Theory of Vortex Interactions", David Spergel et al. To be submitted to *Physical Review Letters*. arXiv:2605.xxxx
231. "KPZ regularity structures with neural networks", Raul Jimenez et al. To be submitted to *JHEP*. arXiv:2605.xxxx
232. "The Calderon Inversion Problem with PINNs", Raul Jimenez et al. To be submitted to *Inverse Problems*. arXiv:2605.xxxx
233. "The Formation Redshift of Globular Clusters", Elena Tomasetti et al. To be submitted to *A&A*. arXiv:2605.xxxx
234. "The Age of the Universe across Cosmic Time", Elena Tomasetti et al. To be submitted to *A&A*. arXiv:2605.xxxx
235. "Constraining the Discreteness of Space-Time", Leonid Srieddine, Raul Jimenez. To be submitted to *JCAP*. arXiv:2605.xxxx
236. "Constraints on Local Non-Gaussianity from the ACT Cluster Catalog Halo Bias", Leonid Srieddine et al. To be submitted to *JCAP*. arXiv:2605.xxxx
237. "From evidence to evident: what is a bayesian prior?", Raul Jimenez et al. To be submitted to *JCAP*.

#### Invited review papers and in other journals

238. "The age of the Universe". Raul Jimenez. In *From Quantum Fluctuations to Cosmological Structures*, ASP Conference Series, **126**, 411, 1997.
239. "Globular cluster ages". Raul Jimenez. In *The Age of the Universe, Dark Matter and Structure Formation*. Proc. Natl. Acad. Sci. USA., **94**, 13-17, 1997.
240. "Setting the stellar evolution clock for intermediate age populations". Raul Jimenez. In *Spectrophotometric dating of stars and galaxies, Annapolis 99*. ASP Conference Series, **192**, 117, 1999.
241. "Towards an accurate determination of the age of the Universe". Raul Jimenez. In *DARK MATTER 98*, IoP, p. 170. 1998.
242. "Extracting cosmological information from galaxy spectra and observations of high-redshift objects". Raul Jimenez. In *Highlights of Spanish astrophysics II, p 1-8*. Eds. J. Zamorano et al. 2001 Kluwer Academic Publishers.
243. "The epoch of galaxy formation". Raul Jimenez. ASP Conference series, **253**, 309, 2002.
244. "The value of the equation of state of dark energy". Raul Jimenez. *New Astronomy Reviews*. **47**, 761, 2003.

245. "Discovery of short-lived SN Ia progenitors". Raul Jimenez. *Proceedings of Science* PoS(SUPERNOVA)017, 2008.
246. "Studying reionization with secondary CMB anisotropies". Licia Verde, Carlos Hernandez-Monteagudo, Zoltan Haiman, Raul Jimenez. *Mem S.A.It.*, **79**, 969, 2008.
247. "Physical classification of galaxies with MOPED/VESPA". Raul Jimenez et al. In *Classification and Discovery in Large Astronomical Surveys, 2008*, C.A.L. Bailer-Jones (ed.), AIP Conference Proceedings vol. 1082, AIP (Melville, New York) ISBN978-0-7354-0613-1.
248. "Evidence for  $< 180$  Gyr SNIa progenitors". Raul Jimenez. In *Probing Stellar Populations out to the Distant Universe*. AIP Conference Proceedings vol. 1111, 485-492, 2009.
249. "On the trail of dark energy". Raul Jimenez, *Nuclear Physics B*, **194**, 245, 2009
250. "Fundamental physics from astronomical observations". Raul Jimenez, *DESY-PROC-2010-03*, 2010.
251. "Cosmological insights into fundamental physics". Raul Jimenez, *Fortschritte der Physik/Progress of Physics*, **59**, 602, 2011.
252. "Data compression methods in astrophysics". Raul Jimenez. In *Statistical Challenges in Modern Astronomy V*, 2012, Eric Feigelson and G. Jogesh Babu (ed.), Springer-Verlag.
253. "A precise determination of the expansion history of the Universe up to  $z \sim 2$ ". Raul Jimenez. In *Particle Physics from TeV to Planck Scale (28 August - 1 September 2011)*, Donji Milanovac, Serbia, Romanian Journal Of Physics (RJP), **57**, 5-6, 2012.
254. "Initial conditions for inflation and the energy scale of SUSY-breaking from the (nearly) gaussian sky", Luis Alvarez-Gaume, Cesar Gomez, Raul Jimenez. In *Cosmology and Particle Physics beyond Standard Models. Ten Years of the SEENET-MTP Network*, edited by Luis Alvarez-Gaume, Goran S. Djordjevic, Dejan Stojkovic, CERN-Proceedings-2014-001, pp. 1–10
255. "Beyond the Standard Model of Physics with Astronomical Observations", Raul Jimenez. In *Cosmology and Particle Physics beyond Standard Models. Ten Years of the SEENET-MTP Network*, edited by Luis Alvarez-Gaume, Goran S. Djordjevic, Dejan Stojkovic, CERN-Proceedings-2014-001, pp. 111–130
256. "Cosmology and Neutrino Physics", Raul Jimenez, *Proceedings of Science* PoS(NEUTEL2017)051, 2017.
257. "On the effect of gas density in the abundance determination of metal rich HII regions", Raul Jimenez. MSc Thesis. Autonomous University of Madrid, 1992.
258. "Late type companions to hot sdO stars". Raul Jimenez, Peter Thejll, Rex Saffer & Uffe G. Jørgensen. In *Hot stars in the Galactic Halo*, Adelman(ed.). Cambridge University Press. p. 211, 1994.
259. "53w091: a 3-Gyr old galaxy at redshift 1.5". John Peacock, James Dunlop, Raul Jimenez, Arjun Dey, Hyron Spinrad, Daniel Stern & Rogier Windhorst. *Spectrum*. **8**, 4, 1995.
260. "Ages of globular clusters: breaking the age-distance degeneracy with the luminosity function". Paolo Padoan & Raul Jimenez. In *The extragalactic distance scale*, Livio et al. (ed.). STScI publications, p. 50, 1996.
261. "The age and distance of globular clusters". Raul Jimenez. In *The extragalactic cosmic distance scale*, Livio et al. (ed.). STScI publications, p. 42, 1996.
262. "Galaxias viejas en un Universo joven". Raul Jimenez. In *Investigacion y Ciencia*. p. 32, April 1997.
263. "The age of LSB discs". Paolo Padoan, Raul Jimenez & Vincenzo Antonuccio-Delogu. In *Star Formation, Near and Far*, Holt & Mundy (ed.). AIP Conference Series, **393**, 315, 1997.

264. "High-z objects and Cold-Dark-Matter cosmogonies: the Case of 53W091". A. Kashlinsky & R. Jimenez. In *The Nature of Elliptical Galaxies, Proceedings of the Second Stromlo Symposium, Arnaboldi M., Da Costa G.S., Saha P. (ed.)*. ASP Conference Series, **116**, 545, 1997.
265. "The Tully-Fisher relation in phenomenological models of galaxy formation". Eelco van Kampen, Raul Jimenez, John A. Peacock. Abstracts of the 19th Texas Symposium on Relativistic Astrophysics and Cosmology, held in Paris, France, Dec. 14-18, 1998. Eds.: J. Paul, T. Montmerle, and E. Aubourg (CEA Saclay).
266. "Eight Gyr minimum age from Hipparcos". Chris Flynn, Raul Jimenez & Eira Kotoneva. *Ap&SS*, **265**, 243, 1999.
267. "The population of Red Giant Stars in globular clusters of the Fornax Dwarf Galaxy". Uffe G. Jorgensen & Raul Jimenez. In *The Carbon Star Phenomenon, Proceedings of the 177th Symposium of the International Astronomical Union, Wing R. (ed.)*. International Astronomical Union Symposia, **177**, 542, 2000.
268. "Energetics of gamma-ray bursts". Tsvi Piran, Raul Jimenez & David Band. In *Gamma-ray Bursts, 5th Huntsville Symposium, Kippen R., Mallozzi R., Fishman G. (ed.)*. AIP Conference Series, **526**, 87, 2001.
269. "Host galaxies as Gamma-Ray burst distance indicators". David Band, Raul Jimenez & Tsvi Piran. In *Gamma-Ray Bursts in the Afterglow Era, Proceedings of the International workshop held in Rome, CNR headquarters, 17-20 October, 2000. Edited by Enrico Costa, Filippo Frontera, and Jens Hjorth*. Springer, p. 215, 2001.
270. "Scaling relations of supersonic turbulence in molecular clouds". Stanislav Boldyrev, Paolo Padoan, Raul Jimenez & Aake Nordlund. *Ap&SS*, **292**, 61, 2004.
271. "On large volume Kahler inflation". Per Berglund, Joan Simon, Licia Verde, Raul Jimenez, Vijay Balasubramanian. American Physical Society, Joint New England Sections of the APS and AAPT Spring Meeting, March 31-April 1, abstract A.003, 2006.
272. "Galaxy catalogs and the diffuse warm gas phase". Carlos Hernandez-Monteagudo, Hy Trac, Raul Jimenez, Licia Verde. *Proceedings of Science PoS(CMB2006)038*, 2006.
273. "Sunyaev-Zeldovich predictions for the Atacama Cosmology Telescope". Menanteau et al. American Astronomical Society Meeting 210, 77.05, 2007.
274. "Massive Optically-selected Clusters In The Act Strip". Menanteau et al. American Astronomical Society Meeting 213, 448.07, 2009.
275. "The cosmic inverse distance ladder: baryon acoustic oscillations and type-Ia supernovae", Antonio J. Cuesta, Licia Verde, Adam Riess, Raul Jimenez. In *Highlights of Spanish Astrophysics VIII, Proceedings of the XI Scientific Meeting of the Spanish Astronomical Society held on September 8-12, 2014, in Teruel, Spain, ISBN 978-84-606-8760-3. A. J. Cenarro, F. Figueras, C. Hernandez-Monteagudo, J. Trujillo Bueno, and L. Valdivielso (eds.), p. 172-176*
276. Invited article "El Descubrimiento del Universo en Expansion", published in Revista de Libros, # 166, 2010.
277. Invited article "Universos Paralelos, Explosiones Cosmicas y la Paradoja de Fermi", JotDown.com, 2016.
278. Invited article "Explosiones cósmicas, la vida y el multiverso", published in Investigación y Ciencia, 2017.
279. Invited article "Robotización Bancaria", published in [pressdigital.es](http://pressdigital.es), 2019.
280. Invited article "La Supremacia Cuántica del Futuro", published in Agenda Publica/ElPaís, October 26, 2019.
281. Invited article "Que Inventen Ell@s", published in Agenda Publica/ElPaís, December 26, 2019.
282. Invited article "Coronavirus: robotiza todo lo que puedas", published in [publico.es](http://publico.es), March 25, 2020.
283. Invited article "Coronavirus: robotiza tot el que puguis", published in [catalunyapress.cat](http://catalunyapress.cat), March 25, 2020.

284. Invited article "Picaresca e ingreso mínimo", published in publico.es, April 19, 2020.
285. Invited article "Picaresca i ingres minim", published in catalunyapress.cat, April 19, 2020.
286. Invited article "Si, la inteligencia artificial podria haver parat el Covid-19", catalunyapress.cat, April 24, 2020.
287. Invited article "Sí, la inteligencia artificial podría haber parado el Covid-19", published in publico.es, April 25, 2020.
288. Invited article "Crisis inacabada: ¿quién controla al robot?", published in Agenda Publica/ElPaís, April 28, 2020.
289. Invited article "Pandemias endémicas y hogares globales", published in publico.es, May 17, 2020.
290. Invited article "Pandemies endemiques i llars globals", catalunyapress.cat, May 17, 2020.
291. Invited article "La Universidad: remota y presencial", published in Agenda Publica/ElPaís, May 30, 2020.
292. Invited article "Privacidad Encriptada", published in Agenda Publica/ElPaís, July 29, 2020.
293. Invited article "Servilismo en Tiempos de Robotizacion", published in Agenda Publica/ElPaís, Sept. 10, 2020.
294. Invited article "Digitaliceme, por favor", published in publico.es, November 6, 2020.
295. Invited article "Funcionarios, ¿con manguito o digitales?", published in Agenda Publica/ElPaís, Nov. 16, 2020.
296. Invited article "Los contagios de covid-19 y el azar: prestemos más atención a los modelos de la física", published in The Conversation, November 25, 2020.
297. Invited article "Algoritmos, Mecánica Cuántica, Inteligencia (Artificial) y Nuestra Sociedad", published by Centro de Estudios Políticos y Constitucionales. M. de la Presidencia, eISBN: 978-84-259-1857-5, December 2020.
298. Invited article "Tras el COVID-19 Todos Centenarios", published in Agenda Publica/ElPaís, December 16, 2020.
299. Invited article "¿Cómo es posible que en tiempos de robotización se trabaje más que antes de la pandemia?", published in The Conversation, April 7, 2021.
300. Invited article "Where is the Agora in a Virtualised Society?", published in Agenda Publica/ElPaís, April 17, 2021.
301. Invited article "Criptodinerero: ¿China Toma la Delantera?", published in Agenda Publica/ElPaís, May 1, 2021.
302. Invited article "¿Debemos dejar que la inteligencia artificial optimice la sociedad?", published in The Conversation, May 4, 2021.
303. Invited article "Imminent dangers: where are we going?", published in CatalunyaPress, May 12, 2021.
304. Invited article "Energía Nuclear para Enfriar el Planeta", published in Agenda Publica/ElPaís, June 19, 2021.
305. Invited article "Energía Nuclear Compacta: Discutamos", published in CatalunyaPress, November 10, 2021.
306. Invited article "Energía del Futuro ¿Suficiente, Limpia y Segura? ", published in Agenda Publica/ElPaís, January 27, 2022.
307. Invited article "Gran Espantada, robotización e ingreso ciudadano universal.", published in Agenda Publica/ElPaís, February 17, 2022.
308. Invited article "Europa, con Nuclear y sin Cryptomoneda", published in publico.es March 27, 2022.
309. "Timing the Universe: a Window into the Physics of the Cosmos", Raul Jimenez, in EAS2022, European Astronomical Society Annual Meeting, 2022, Art. no. 145.
310. "The Age of the Universe with Globular Clusters: Multiple Stellar Populations", Valcin D., Jimenez R., Verde L., Wandelt B., EAS.. CONF, 641, 2023