



Alejandro Serrano Borlaff

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About me: NASA Postdoctoral Fellow at the Ames Research Center. Ph.D. in Astrophysics. Specialist in calibration and operations of space and ground-based telescopes. Expert on multi-wavelength observational astronomy and instrumentation. Developing small-sat missions. Team member of the NASA/DLR Stratospheric Observatory for Infrared Astronomy (SOFIA) and ESA/Euclid. Rescue scuba-diver.

● WORK EXPERIENCE

23/10/2019 – CURRENT – Mountain View, California, United States

NASA POSTDOCTORAL PROGRAM FELLOWSHIP – NASA AMES RESEARCH CENTER

Selected in 2019 for the **NASA Postdoctoral Program Fellowship** (<https://npp.usra.edu/>) at the Ames Research Center, in California, USA (Supervisor: Dr. Pamela M. Marcum). As part of the **NASA Space Science & Astrobiology division** I am leading the following main projects:

1) Designing in-flight self-calibration methods for the optical detector of the **ESA/Euclid Space Telescope** (Contact: Dr. Pamela M. Marcum NASA/Ames, Dr. Bruno Altieri, ESA/ESAC).

2) Studying the extragalactic magnetic fields through the far-infrared emission of galaxies, as part of the **NASA/DLR Stratospheric Observatory for Infrared Astronomy (SOFIA)** Legacy team. (Contact: Dr. Enrique Lopez-Rodriguez, KIPAC/Stanford)

3) Developing new detection methods for extended, ultra-low emission X-ray sources, for the **NASA/Chandra X-ray Observatory** (Contact: Dr. Pamela M. Marcum)

4) Exploring the structure of the hydrogen gas in local Universe galaxies using the **Karl G. Jansky Very Large Array (VLA) radio telescope** (Contact: Prof. John E. Beckman, IAC).

Among other projects, I am part of the research and development teams of two small-sat class space telescope mission projects: **DUNES** (PI: Dr. Rafaél Guzman, Satlantis/U. Florida/UCM) and **MESSIER** (PI: Dr. Armando Gil de Paz, UCM - Dr. David Valls-Gabaud, OBSPM). I have participated as a reviewer for the **NASA Research Opportunities in Space and Earth Science (ROSES)** and **Future Investigators in NASA Earth and Space Science and Technology (FINESST)** programs.

25/03/2019 – 25/10/2019 – Madrid, Spain

ESAC FACULTY RESEARCH SPECIALIST – ESA/ESAC, EUROPEAN SPACE ASTRONOMY CENTRE

Research scientist visitor at **ESA European Space Astronomy Centre**, as part of the **ESA/Euclid** Legacy science team. Contact: Dr. Bruno Altieri (ESA/ESAC) and Roland Vavrek (ESA/ESAC). The main objectives of the project are:

1) Determine the capabilities of Euclid to detect extended, low emission objects like diffuse galaxies or the dust galactic cirri of the Milky Way,

2) Develop alternative in-orbit calibration strategies based on the experience with the previous spacecraft like the *Hubble* Space Telescope.

These techniques will serve to improve the quality of the images of the Euclid mission, allowing the detection of ultra-faint astronomical objects, and enabling the study of the darkest regions of the Universe as an extension to the primary science mission.

Directorate of Science | comunicacionesac@esa.int | http://www.esa.int/About_Us/ESAC |

Camino Bajo del Castillo s/n, 28692, Villafranca del Castillo, Spain

20/09/2014 – 19/11/2018 – San Cristobal de La Laguna, Santa Cruz de Tenerife, Spain

RESIDENT ASTROPHYSICIST PHD PROGRAMME – IAC, INSTITUTO ASTROFISICO DE CANARIAS

Position: Ph.D. fellowship at the Instituto de Astrofísica de Canarias (Spain). Resident Astrophysicist Programme.

Thesis: "Understanding the outskirts of disc galaxies"

Mark: Distinction Excellent Cum laude

Link: Spanish Ministry of Education Ph.D. Thesis Archive: <https://www.educacion.gob.es/teseo/mostrarRef.do?ref=1723359>

The main objective of my Ph.D. project was to study the structure of disc galaxies, looking for signs of violent past interactions between galaxies in the darkest regions of the Universe. To do this, we improved the calibration of the infra red detector of the Wide Field Camera 3 in the **Hubble Space Telescope**, allowing us to improve the deepest image of the Universe ever done from space: the Hubble Ultra Deep Field.

I have gathered four years of experience as part of the **operations and support team (~50 observing nights) at the telescopes of the Roque de los Muchachos Observatory** (La Palma, Canary Islands). This included the assembly and operation of the [GHAFAS/Fabry-Pérot spectrograph](#), as well as the leadership of the instrument team during the commissioning of the adaptive optics module AOLI at the [William Herschel Telescope](#), and the commissioning and testing of the [NEFER spectrograph](#) at the Gran Telescopio Canarias. I have been telescope operator during multiple science observation runs at the ESA/Optical Ground Station telescope at Izaña (Tenerife), the SARA Kitt Peak 0.9m, and the Calar Alto 2.2m telescopes. In addition, I have obtained a large technical experience including optical, electronic, and mechanical systems (i.e, assembly of heavy equipment, 3D printing), which were particularly useful to support the observations at the William Herschel Telescope.

Ph.D. supervisors: Prof. John E. Beckman (IAC/CSIC) & Dr. Carmen Eliche-Moral (UCM).

Astrophysics | secadm@iac.es | <https://www.iac.es/es> |

Calle Vía Láctea S/N, 38205, San Cristóbal de La Laguna, Spain

<https://www.educacion.gob.es/teseo/mostrarRef.do?ref=1723359>

27/05/2014 – 14/09/2014 – Teruel , Spain

CEFCA FELLOWSHIP IN ASTROPYSICS RESEARCH – CENTRO DE ESTUDIOS DE FÍSICA DEL COSMOS DE ARAGÓN

Summer research fellowship at the Centro de Estudios de Física del Cosmos de Aragón (CEFCA), in Teruel, Spain.

The main project was focused to study the detailed morphology (disc, elliptical, merging) of more than 2,000 galaxies from the ALHAMBRA survey (Advanced Large, Homogeneous Area Medium Band Redshift Astronomical Survey). In order to do that, we used a specialized method to reconstruct the effects of the expansion of the Universe on astronomical images using the ALHAMBRA narrow-band optical and near-infrared filter system. The classification of objects would be used to train Neural Networks for the automated analysis of future astronomical explorations.

Project Supervisor: Dr. Jesus Varela (CEFCA)

Astrophysics | administracion@cefca.es | <http://www.cefca.es/> | Plaza San Juan, 1 , Planta 2, 44001, Teruel, Spain

● EDUCATION AND TRAINING

28/09/2014 – 26/11/2018 – Calle Via Lactea S/N, San Cristobal de La Laguna, Santa Cruz de Tenerife , Spain

PH.D. IN ASTROPHYSICS – Instituto de Astrofísica de Canarias

Distinction Excellent Cum laude | Understanding the outskirts of disc galaxies | EQF level 8 | <https://www.iac.es/>

06/09/2013 – 06/09/2014 – Plaza Ciencias 1, Madrid , Spain

MASTER'S DEGREE IN ASTROPHYSICS, – Universidad Complutense de Madrid

Distinctions:

- Interstellar medium (10/10).
- Galactic dynamics (9.8/10).
- Statistical methods and data analysis (10/10).
- Experimental methods in Astrophysics (9.7/10).

9.07/10 | "Morphological visual classification of galaxies at cosmological distances". Mark: (9.4/10) | EQF level 7 |

ECTS | 60 | <https://fisicas.ucm.es/>

Distinctions:

- Analog and digital electronics (10/10).
- Experimental methods in Astrophysics (9.7/10).
- Interstellar medium (10/10).

7.8/10 | "Antitruncated disks on lenticular galaxies formed through major mergers" (9.5/10) | EQF level 7 | ECTS |

304.5 | <https://fisicas.ucm.es/>

● LANGUAGE SKILLS

Mother tongue(s): SPANISH**Other language(s):**

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	C1	C1	C1	C1
RUSSIAN	A1	A1	A1	A1	A1
FRENCH	A1	A1	A1	A1	A1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

● NETWORKS AND MEMBERSHIPS

29/03/2020 – CURRENT

ESA/Euclid Consortium member - US segment

Member of the Euclid Consortium for the development of the ESA-led mission Euclid Space Telescope.

US-segment, Local Universe Science Working Group

Contact:

- Dr. Jason Rhodes (NASA/JPL, jason.d.rhodes@jpl.nasa.gov),
- Dr. Bruno Altieri (ESA/ESAC, bruno.altieri@sciops.esa.int)

Working Packages (WP):

- WP3 - Calibration for extended emission (PI: Dr. Mohammad Akhlaghi, mohammad@akhlaghi.org)
- WP7 - Exploring the Ultra Low surface Brightness (PI: Dr. Fernando Buitrago, fbuitrago@oal.ul.pt)

31/10/2020 – CURRENT

DUNES Space Telescope collaboration

Collaborator on the design and development of the DUNES Space Telescope, a project for a binocular optical and near-infrared Cubesat/Small space telescope dedicated to explore the low surface brightness Universe.

PI: Dr. Rafael Guzmán Llorente (rafagu01@ucm.es)

30/06/2019 – CURRENT

MESSIER surveyor collaboration

Collaborator on the development of the MESSIER surveyor, a proposed small space telescope to explore the Universe in ultraviolet and optical wavelengths.

PI: Prof. Armando Gil de Paz (agil@fis.ucm.es)co-PI: Dr. David Valls-Gabaud (david.valls-gabaud@observatoiredeparis.psl.eu)<https://ui.adsabs.harvard.edu/abs/2017IAUS..321..199V/abstract>

01/11/2017 – CURRENT

International Space Science Institute (ISSI) - Exploring the Ultra-Low Surface Brightness Universe team

Bern, Switzerland

International Space Science Institute - Member of the "Exploring the Ultra-Low Surface Brightness Universe" team

Project leader: Dr. David Valls-Gabaud

<https://www.issibern.ch/teams/ultralowsurf/index.php/team/>

● CONFERENCES AND SEMINARS

22/05/2021 – 25/05/2021 – Lausanne, Switzerland (Virtual conference)

Euclid Consortium meeting 2021 talk - Challenges in low surface brightness astronomy with Euclid

Invited talk at the Low Surface Brightness splinter session of the Euclid Consortium meeting 2021, focused on the technical challenges to detect dim sources from space, and strategies to improve the capabilities of ESA/Euclid space telescope.

<https://www.epfl.ch/labs/lastro/meetings/euclid-meetings/euclid-conference-2021/>

22/03/2021 – 26/03/2021 – Hiroshima, Japan (Virtual conference)

International Astronomical Union Special Session 360: Astronomical Polarimetry - New Era of Multi-Wavelength Polarimetry

Contributed talk. Title: The Multi-phase Spiral Magnetic Field of M51

In collaboration with the Stratospheric Observatory for Infrared Astronomy (SOFIA).

<https://astropol2020-iau.jp/>

25/02/2021 – Space Telescope Science Institute (Virtual conference)

STScI Journal Club - Chasing ghosts: Challenges in low surface brightness astronomy

10/01/2021 – 14/01/2021 – Virtual conference

237th Meeting of the American Astronomical Society

Contributed talk: The multi-phase spiral magnetic field of M51

<https://aas.org/meetings/aas237>

02/10/2020 – 06/10/2020 – Space Telescope Science Institute

STScI Workshop - Galaxy Formation and Evolution in the Era of the Nancy Grace Roman Space Telescope

Talk - Presentation of the ESA/Euclid Low Surface Brightness Science project

<https://www.stsci.edu/contents/events/stsci/2020/october/galaxy-formation-and-evolution-in-the-era-of-the-nancy-grace-roman-space-telescope>

29/06/2020 – 03/07/2020 – Virtual conference

European Astronomical Society 2020

Poster presentation - Below the iceberg: Extended low surface brightness structures with HST and Euclid

06/2019 – Tenerife, Spain

IAU Special Session 355 - "The Realm of the Low Surface Brightness Universe"

Contributed talk - New limits to low surface brightness details: the Hubble ultra deep field even deeper.

30/05/2019 – Universidad Complutense de Madrid - Faculty of Physics

IPARCOS invited seminar: Probing the ultra-low surface brightness Universe

https://www.ucm.es/data/cont/media/www/pag-101014/IPARCOS_Alejandro_Borlaff-compressed.pdf

Contributed talk - The ultra-low surface brightness Universe as a counterpart to SKA detections.

31/01/2019 – ESAC - Madrid (Spain)

ESA/ESAC Seminars - "The ultra-low surface brightness Universe with HST and future space telescope"

Seminar organized at the ESA European Space Astronomy Center focused on the capabilities and techniques developed for the Hubble Space Telescope and applicable to future space telescopes like ESA/Euclid, NASA/Roman, and JWST to detect extended sources through high-precision in-orbit calibration of optical and near-infrared detectors.

https://www.cosmos.esa.int/documents/13611/1854427/20190131_borlaff_v2.pdf/2b632496-6303-0bc6-2af8-9b9ab6d354ba

03/04/2018 – 06/04/2018 – Liverpool, United Kingdom

European Week of Astronomy and Space Science 2018

Poster contribution: Evolution of the antitruncated stellar profiles of S0 galaxies since $z=0.6$

06/2017 – University of Oulu, Oulu, (Finland)

Invited seminar - "Understanding the outskirts of galaxies"

Scientific presentation at the Department of Space Physics and Astronomy at the University of Oulu, Finland

12/11/2017 – 16/11/2017 – Bern, Switzerland

International Space Science Institute - "Exploring the Ultra-Low Surface Brightness Universe"

Young Scientist invited talk: "Looking for the missing light of the Hubble Ultra Deep Field"

<https://www.issibern.ch/teams/ultralowsurf/index.php/team/>

12/03/2016 – 16/03/2016 – Toledo (Spain)

International Astronomical Union Special Session 321: "Formation and Evolution of Galaxy Outskirts"

Contribution: Two scientific posters and an oral presentation. 1) Truncated disc surface brightness profiles produced by flares and, 2) Evolution of the anti-truncated stellar profiles of S0 galaxies since $z=0.6$ in the SHARDS survey.

21/06/2015 – 25/06/2015 – Santa Cruz de Tenerife (Spain)

European Week of Astronomy and Space Science 2015

Scientific poster contribution: "Antitruncated stellar discs resulting from major mergers"

<https://eas.unige.ch/EWASS2015/>

● PUBLICATIONS

Euclid preparation: XIII. Exploring the ultra low surface brightness Universe with Euclid/VIS

Borlaff et al. 2021

2021

Key project publication for the ESA/Euclid mission. Approved by the **Euclid** Consortium Editorial Board.

Designing new in-flight calibration methods for the VIS optical instrument of the ESA/Euclid Space Telescope.

Extragalactic Magnetism with SOFIA (Legacy Program) -- I: The magnetic field in the multi-phase interstellar medium of M51

Borlaff et al. 2021

<http://galmagfields.com/singleobjects/m51.html> – 2021

First publication for the joint legacy project Magnetic fields in galaxies of the Stratospheric Observatory for Infrared Astronomy (SOFIA).

Mapping the magnetic field of the Whirlpool galaxy with SOFIA/HAWC+. Submitted to *The Astrophysical Journal* (May 14th, 2021)

<https://arxiv.org/abs/2105.09315>

The multi-phase spiral magnetic field of M51

Borlaff et al. 2021

<https://ui.adsabs.harvard.edu/abs/2021AAS...23743001B/abstract> – 2021

American Astronomical Society meeting #237, id. 430.01. Bulletin of the American Astronomical Society, Vol. 53, No. 1 e-id 2021n1i430p01

Hidden Depths in the Local Universe: the Stellar Stream Legacy Survey

Martinez-Delgado et al. 2021

<https://ui.adsabs.harvard.edu/abs/2021arXiv210406071M/abstract> – 2021

Exploring the remains of galactic cannibalism using the DESI Legacy Imaging Survey. Submitted to the Monthly Notices of the Royal Astronomical Society. In revision.

The Galaxy "Missing Dark Matter" NGC 1052-DF4 is Undergoing Tidal Disruption

Montes et al. 2020

<https://ui.adsabs.harvard.edu/abs/2020ApJ...904..114M/abstract> – 2020

In this paper we study how large galaxies might be stripping the Dark Matter out of smaller ones through galactic interactions. The Astrophysical Journal, Volume 904, Issue 2, id.114, 12 pp.

Arp 70: an interacting galaxy with extreme outflows

Camps-Fariña et al. 2020

<https://ui.adsabs.harvard.edu/abs/2020MNRAS.493.1434C/abstract> – 2020

Extremely energetic star formation regions are detected in the galaxy Arp 70. We identify a very large expanding superbubble of 5 kpc in diameter, possibly created by a past galactic collision. Published in Monthly Notices of the Royal Astronomical Society, Volume 493, Issue 1, pp.1434-1446

A distance of 13 Mpc resolves the claimed anomalies of the galaxy lacking dark matter

Trujillo et al. 2019

<https://ui.adsabs.harvard.edu/abs/2019MNRAS.486.1192T/abstract> – 2019

We measure the distance to the galaxy NGC 1052-DF2, finding that it is much closer than previously thought, and that contains a large fraction of Dark Matter, contradicting previous analyses. Published in Monthly Notices of the Royal Astronomical Society, Volume 486, Issue 1, p.1192-1219

The missing light of the Hubble Ultra Deep Field

Borlaff et al. 2019

<https://ui.adsabs.harvard.edu/abs/2019A%26A...621A.133B/abstract> – 2019

We developed a new method to improve the images of the Hubble Space Telescope, providing in-flight corrections to its Wide Field Camera 3 infrared detector. Using this method we found new light around distant galaxies to extraordinary detail, showing that some of the galaxies have now almost doubled their extension. Astronomy & Astrophysics, Volume 621, id.A133, 34 pp.

Project website: <http://research.iac.es/proyecto/abyss/>

Star-forming galaxies at low-redshift in the SHARDS survey

Lumbreras-Calle et al. 2019

<https://ui.adsabs.harvard.edu/abs/2019A%26A...621A..52L/abstract> – 2019

Measuring the age of the stellar populations in distant galaxies using the Hubble Space Telescope and ground-based observatories. *Astronomy & Astrophysics*, Volume 621, id.A52, 16 pp.

Formation of S0 galaxies through mergers. Morphological properties: tidal relics, lenses, ovals, and other inner components

Eliche-Moral et al. 2018

<https://ui.adsabs.harvard.edu/abs/2018A%26A...617A.113E/abstract> – 2018

In this paper we study the formation of stellar disks after major galactic collisions using N-body hydrodynamical simulations. *Astronomy & Astrophysics*, Volume 617, id.A113, 37 pp.

Evolution of the anti-truncated stellar profiles of S0 galaxies since $z = 0.6$ in the SHARDS survey. II. Structural and photometric evolution

Borlaff et al. 2018

<https://ui.adsabs.harvard.edu/abs/2018A%26A...615A..26B/abstract> – 2018

We study the evolution of the envelopes of stars around galaxies at cosmological distances using deep Hubble Space Telescope imaging. *Astronomy & Astrophysics*, Volume 615, id.A26, 26 pp.

Precision Determination of Corotation Radii in Galaxy Disks: Tremaine-Weinberg versus Font-Beckman for NGC 3433

Beckman et al. 2018

<https://ui.adsabs.harvard.edu/abs/2018ApJ...854..182B/abstract> – 2018

We present a new method to measure the rotation speed of the spiral pattern in galaxies, using the GHAFAS/Fabry-Pérot spectroscopic system at the William Herschel Telescope and MUSE at the Very Large Telescope. *The Astrophysical Journal*, Volume 854, Issue 2, article id. 182, 7 pp. (2018).

The ALHAMBRA survey: 2D analysis of the stellar populations in massive early-type galaxies at $z < 0.3$

San Roman et al. 2018

<https://ui.adsabs.harvard.edu/abs/2018A%26A...609A..20S/abstract> – 2018

We analyze the age of stars on distant galaxies using the observations of the ALHAMBRA survey. *Astronomy & Astrophysics*, Volume 609, id.A20, 38 pp.

Evolution of the anti-truncated stellar profiles of S0 galaxies since $z = 0.6$ in the SHARDS survey. I. Sample and methods

Borlaff et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017A%26A...604A.119B/abstract> – 2017

We develop new methods to correct from scattered light on the Advanced Camera for Surveys (ACS) of the Hubble Space Telescope. Published in *Astronomy & Astrophysics*, Volume 604, id.A119, 71 pp.

Formation of S0 galaxies through mergers. Evolution in the Tully-Fisher relation since $z \sim 1$

Tapia et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017A%26A...604A.105T/abstract> – 2017

Using N-body simulations of galactic collisions, we demonstrate that the resulting disk galaxies formed after the merger can present normal rotation patterns, similar to those observed in real galaxies. *Astronomy & Astrophysics*, Volume 604, id.A105, 20 pp.

Kinematics of the ionized and molecular gas in nearby luminous infrared interacting galaxies

Zaragoza-Cardiel et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017MNRAS.465.3461Z/abstract> – 2017

We use the Galaxy H α Fabry-Perot system mounted on the 4.2 m William Herschel Telescope to explore the density of the star forming regions in colliding galaxies. *Monthly Notices of the Royal Astronomical Society*, Volume 465, Issue 3, p. 3461-3474

Evolution of the anti-truncated stellar profiles of S0 galaxies since $z=0.6$ in the SHARDS survey

Borlaff et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017IAUS..321..280B/abstract> – 2017

Formation and Evolution of Galaxy Outskirts, Proceedings of the International Astronomical Union, IAU Symposium, Volume 321, pp. 280-280

Truncated disc surface brightness profiles produced by flares

Borlaff et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017IAUS..321..272B/abstract> – 2017

Formation and Evolution of Galaxy Outskirts, Proceedings of the International Astronomical Union, IAU Symposium, Volume 321, pp. 272-272

Antitruncations

Beckman et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017IAUS..321..190B/abstract> – 2017

Formation and Evolution of Galaxy Outskirts, Proceedings of the International Astronomical Union, IAU Symposium, Volume 321, pp. 190-192

Creating lenticular galaxies with mergers

Querejeta et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017IAUS..321..114Q/abstract> – 2017

Formation and Evolution of Galaxy Outskirts, Proceedings of the International Astronomical Union, IAU Symposium, Volume 321, pp. 114-116

Kinematic Clues to Bar Evolution for Galaxies in the Local Universe: Why the Fastest Rotating Bars are Rotating Most Slowly

Font et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017ApJ...835..279F/abstract> – 2017

We study the dynamical effects of stellar bars and their pattern speeds in the global kinematics of spiral galaxies. The Astrophysical Journal, Volume 835, Issue 2, article id. 279, 21 pp. (2017).

Evidence for the non-destruction of the Most Massive Molecular Clouds even after they have given Birth to Massive Star Clusters

Zaragoza-Cardiel et al. 2017

<https://ui.adsabs.harvard.edu/abs/2017IAUS..316..135Z/abstract> – 2017

Formation, evolution, and survival of massive star clusters, Proceedings of the International Astronomical Union, IAU Symposium, Volume 316, pp. 135-136

Three supernova shells around a young M33 star cluster

Camps-Fariña et al. 2016

<https://ui.adsabs.harvard.edu/abs/2016MNRAS.461L..87C/abstract> – 2016

We detect a set of three concentric expanding ionized gas shells in the nearby spiral galaxy M33. Monthly Notices of the Royal Astronomical Society: Letters, Volume 461, Issue 1, p.L87-L91

Gravity Binding and Pressure Bounding of Hii regions and Molecular Clouds in Interacting Galaxies

Zaragoza-Cardiel et al. 2016

<https://ui.adsabs.harvard.edu/abs/2016IAUS..315E..84Z/abstract> – 2016

From Interstellar Clouds to Star-Forming Galaxies: Universal Processes?, Proceedings of the International Astronomical Union, IAU Symposium, Volume 315, article id. E84

Type-II surface brightness profiles in edge-on galaxies produced by flares

Borlaff et al. 2016

<https://ui.adsabs.harvard.edu/abs/2016A%26A...591L...7B/abstract> – 2016

We study the effects of relative orientation in the observed morphology of disk galaxies, paying a particular attention to the shape of their galactic outer edges. *Astronomy & Astrophysics*, Volume 591, id.L7, 5 pp.

Creating S0s with Major Mergers: A 3D View

Querejeta et al. 2015

<https://ui.adsabs.harvard.edu/abs/2015Galax...3..202Q/abstract> – 2015

Contrary to popular belief, major collisions of galaxies (mergers) can produce ordered disk-like galaxies. *Galaxies*, vol. 3, issue 4, pp. 202-211

Formation of S0 galaxies with intermediate kinematics by minor mergers

Tapia et al. 2015

<https://ui.adsabs.harvard.edu/abs/2015IAUGA..2253560T/abstract> – 2015

IAU General Assembly, Meeting #29, id.2253560

Scaling relations of antitruncated stellar discs in galaxies across the Hubble Sequence

Eliche-Moral et al. 2015

<https://ui.adsabs.harvard.edu/abs/2015IAUGA..2253634E/abstract> – 2015

IAU General Assembly, Meeting #29, id.2253634

Photometric scaling relations of anti-truncated stellar discs in S0-Scd galaxies

Eliche-Moral et al. 2015

<https://ui.adsabs.harvard.edu/abs/2015A%26A...580A..33E/abstract> – 2015

We explore the connections between the extension of the disks of galaxies and the shape of their borders. *Astronomy & Astrophysics*, Volume 580, id.A33, 18 pp.

Formation of S0 galaxies through mergers. Explaining angular momentum and concentration change from spirals to S0s

Querejeta et al. 2015

<https://ui.adsabs.harvard.edu/abs/2015A%26A...579L...2Q/abstract> – 2014

Galaxies evolve between types. Spirals lose their spiral arms and transform into lenticular galaxies. We demonstrate that this can happen after a galactic collision. *Astronomy & Astrophysics*, Volume 579, id.L2, 6 pp.

Formation of S0 galaxies through mergers. Bulge-disc structural coupling resulting from major mergers

Querejeta et al. 2014

<https://ui.adsabs.harvard.edu/abs/2015A%26A...573A..78Q/abstract> – 2014

We explore if the inner bulge of lenticular galaxies formed after mergers is similar in shape to that of real-life galaxies of the same type. *Astronomy & Astrophysics*, Volume 573, id.A78, 23 pp.

Formation of S0 galaxies through mergers. Antitruncated stellar discs resulting from major mergers

Borlaff et al. 2014

<https://ui.adsabs.harvard.edu/abs/2014A%26A...570A.103B/abstract> – 2014

Some galaxies present scattered structures of stars surrounding their main body. These outer-edge stellar structures could be a fossil of ancient galactic collisions. *Astronomy & Astrophysics*, Volume 570, id.A103, 30 pp.

Evolution induced by dry minor mergers onto fast-rotator S0 galaxies

Tapia et al. 2014

<https://ui.adsabs.harvard.edu/abs/2014A%26A...565A..31T/abstract> – 2014

We explore the effect on the global kinematics of galactic bombardment by dwarf galaxies into normal-sized galaxies. *Astronomy & Astrophysics*, Volume 565, id.A31, 19 pp.

● RECOMMENDATIONS

Pamela M. Marcum – Supervisor – pamela.m.marcum@nasa.gov – (+1) 6693779265
Research Scientist at the NASA Ames Research Center. Current Postdoctoral supervisor.

John Beckman – Ph.D. advisor – jeb@iac.es – (+34) 600557639
Research Scientist at the Instituto de Astrofísica de Canarias (Spain). Doctor Honoris Causa by the University of La Laguna. Ph.D. supervisor at IAC.

Bruno Altieri – Supervisor at ESA/ESAC – bruno.altieri@sciops.esa.int – (+34) 918131340
European Space Agency (ESA) - Directorate of Science and Robotic Exploration.
Astronomer and Instrument Staff Scientist. Euclid Archive Scientist.

● HONOURS AND AWARDS

04/06/2019

NASA Postdoctoral Fellowship Award – NASA / USRA

NASA Postdoctoral Award - Fellowship for research at the NASA Ames Research Center in California.
Award: \$73,866 per yr for a period of 3 years.
<https://npp.usra.edu/fellows/current/?s=center>

21/12/2020

NASA Stratospheric Observatory for Infrared Astronomy Cycle 9 - Observing Award – NASA/SOFIA

Stratospheric Observatory for Infrared Astronomy Observing Award
Project: ID:09_0113 - "Testing for multi-component magnetic fields and their effects on the structure of galactic disks"
Role: Principal Investigator
Award: \$201,000 grant + 20.1h of observing time with SOFIA/HAWC+

08/11/2020

Karl G. Jansky Very Large Array - Cycle 21A Observing Award – National Radio Astronomy Observatory (NRAO)

NRAO/JVLA Cycle 21A award, November 2020.
Project: VLA/21A-043 "Flares, breaks and warps in the outskirts of the HI and stellar disk of UGC11859"
Role: Principal Investigator
Award: 11.49h, HI 21cm observations, VLA C-array configuration

30/04/2020

Karl G. Jansky Very Large Array - Director's Discretionary Time Observing Award – National Radio Astronomy Observatory (NRAO)

NRAO/JVLA Director's Discretionary time award, May 2020.
Project: VLA/20A-485 "Flares, warps and breaks in the outskirts of the HI and stellar disk of UGC11859"
Role: Principal Investigator
Award: 9h, HI 21cm observations, VLA C-array configuration

09/08/2019

Juan de la Cierva Postdoctoral Fellowship Award – Spanish ministry for research and education

Postdoctoral fellowship awarded by the Ministry for Research and Education - Government of Spain (awarded, declined)

29/08/2018

Gran Telescopio Canarias - Observing Award - Instituto de Astrofísica de Canarias

GTC 10.4m telescope Observational Award.

Project ID: GTC61-18B "Ultra-deep imaging of edge-on galaxies: Flares, satellites and stellar halos"

Role: Principal Investigator

Award: 8.4h of observing time, OSIRIS broadband imaging detector

01/04/2018

Finnish Centre for Astronomy with ESO visitor program - Fellowship award - Finnish Centre for Astronomy with ESO

Research award, supporting travel and accommodation at the University of Oulu, Finland

Project: "Model-based pattern speed analysis of galaxy NGC 3433"

Director: Dr. Pertti Rautiainen

01/11/2017

International Space Science Institute - Young scientist award - International Space Science Institute

Research workshop award, supporting travel and accommodation at the "Exploring the Ultra-Low Surface Brightness Universe" team group (Bern, Switzerland, 2017)

Director: David Valls-Gabaud

01/06/2017

ERASMUS+ Programme Award - European Commission - Universidad de La Laguna

ERASMUS+ Programme Award, supporting travel, accommodation for a 3-month visit to the University of Oulu, Finland.

Director: Prof. Heikki Salo, Dr. Pertti Rautiainen

05/2017

IAC Convive Award - Journal Club - Instituto de Astrofísica de Canarias

Award obtained as part of the Staff organizing team of *The Journal Club*: a weekly scientific seminar held at the Instituto de Astrofísica de Canarias. For helping to promote and strength the work environment at the IAC and its international projection in 2017.

31/08/2016

William Herschel Telescope - Observing Award - Instituto de Astrofísica de Canarias

WHT 4.2m telescope Observational Award.

Project ID: 96-WHT11/16B "UGC01382 - An elliptical galaxy surrounded by spiral arms"

Role: Principal Investigator

Award: 24.0h of observing time GHaFAS Fabry-Pérot spectrometer.

16/03/2016

Best scientific poster award - International Astronomical Union Special Session 321 - International Astronomical Union

International Astronomical Union Special Session 321: "Formation and Evolution of Galaxy Outskirts"

Awarded best scientific poster: "Truncated disc surface brightness profiles produced by flares"

01/09/2015

William Herschel Telescope Cycle 15B - Observing Award - Instituto de Astrofísica de Canarias

WHT 4.2m telescope Observational Award.

Project ID: 121-WHT28/15B "The structure of dynamic resonances in galaxies: Stars vs. gas."

Role: Principal Investigator

Award: 16.0h of observing time, GHAFAS Fabry-Pérot spectrometer + ACAM imaging detector

01/09/2015

IRAM 30m Radioastronomy Summerschool - Support grant – Institut de Radioastronomie Millimetrique (IRAM)

IRAM 30m student grant, supporting travel, accommodation for the IRAM 30m Radioastronomy Summerschool at Pico Veleta Observatory, Granada (Spain)

29/05/2013

UCM Academic Distinction - Analog and digital electronics – Universidad Complutense de Madrid

Alumni Award for Academic Distinction on Analog and digital electronics - B.S. degree on Physics - Universidad Complutense de Madrid

31/05/2013

UCM Academic Distinction - Galactic dynamics – Universidad Complutense de Madrid

Alumni Award for Academic Distinction on Galactic Dynamics - Master's degree on Astrophysics - Universidad Complutense de Madrid

31/05/2013

UCM Academic Distinction - Interstellar medium – Universidad Complutense de Madrid

Alumni Award for Academic Distinction on Interstellar medium - Master's degree on Astrophysics - Universidad Complutense de Madrid

09/06/2013

UCM Academic Distinction - Experimental methods in Astrophysics – Universidad Complutense de Madrid

Alumni Award for Academic Distinction on Experimental methods in Astrophysics - Master's degree on Astrophysics - Universidad Complutense de Madrid

09/06/2013

UCM Academic Distinction - Statistical methods and data analysis – Universidad Complutense de Madrid

Alumni Award for Academic Distinction on Statistical methods and data analysis - Master's degree on Astrophysics - Universidad Complutense de Madrid

● **COMMUNICATION AND INTERPERSONAL SKILLS**

Press conference - 237th Meeting American Astronomical Society

Press conference at the 237th Meeting of the American Astronomical Society, representing the NASA/SOFIA Legacy science project.

Title: Magnetic Chaos Hidden in the Whirlpool Galaxy

<https://youtu.be/KjAlRbaMBbw>

Astronomy Picture of the Day - The Magnetic Field of the Whirlpool Galaxy

Selected Astronomy Picture of the Day (APOD) on January 20th, 2021.

Credit. A.S.Borlaff, L. Proudfit, NASA/DLR Stratospheric Observatory for Infrared Astronomy (SOFIA) observatory, and the SOFIA Magnetic Fields in Galaxies Legacy Program.

<https://apod.nasa.gov/rjn/apod/ap210120.html>

Press release - Making the Hubble's deepest images even deeper

International scientific press release published in January 2019. Based on the results of "The Missing light of the Hubble Ultra Deep Field" Borlaff et al. 2019.

Published in international media, including BBC and Space.com.

<https://www.iac.es/en/outreach/news/making-hubbles-deepest-images-even-deeper> <https://www.bbc.com/mundo/noticias-47002308> <https://www.space.com/43147-hubble-telescope-deepest-universe-view-photo.html> <https://www.businessinsider.de/wissenschaft/das-hubble-teleskop-hat-ein-foto-vom-rand-des-uns-bekannten-weltalls-gemacht-2019-1/> <https://www.lci.fr/sciences/dites-merci-a-hubble-voici-la-vue-la-plus-lointaine-de-l-univers-astronomie-2111149.html>

Radio interview - "The deepest image of the Universe ever taken from space"

January 2019. Interviewed in Cadena COPE in the outreach channel "La Linterna" as the principal researcher of the project that made the most precise version of the Hubble Ultra Deep Field to date.

https://www.cope.es/programas/la-linterna/el-tema-del-dia/noticias/echamos-una-nueva-mirada-ciencia-espana-20190130_343045

Radio interview - "NASA repairs Hubble Space Telescope"

October 2018. Interviewed as an expert on space telescopes by Cadena SER, because of the failure in 2018 of one of the gyroscopes of the Hubble Space Telescope.

https://cadenaser.com/ser/2018/10/24/ciencia/1540376710_173222.html

At the telescope - Youtube channel

December 2016 - Short youtube channel dedicated to explaining astronomy and astrophysics from the inside of professional telescopes at the Roque de los Muchachos, in La Palma (Canary Islands, Spain).

<https://www.youtube.com/channel/UCUu3wV-39YjwQzUFu097-7w>

Press release - Lenticular galaxies might have been formed by galactic mergers

Scientific press release published in April 2015. Based on the results of "Formation of S0 galaxies through mergers. Antitruncated stellar discs resulting from major mergers" Borlaff, A. et al. 2014.

<https://www.efc.com/efe/espana/sociedad/el-origen-de-las-galaxias-lenticulares-algo-mas-conocido/10004-2588414>

Press interview - La Prensa de Villa

Personal interview in *La Prensa de Villa*, a local newspaper dedicated to reporting news from Villaviciosa de Odón (Madrid, Spain), dedicated to science, outreach, and the way to become an ESA and NASA scientist. December 2019.

<http://www.laprensadevilla.es/blog/la-prensa-de-villa-54/>

● ACADEMIC / TEACHING EXPERIENCE

01/03/2020 – 31/12/2020

Master Thesis in Astronomy and Astrophysics mentor - Valencian International University (VIU)

Co-director of the Master's thesis (Student: Luis Ossa Fuentes). Project: "Galactic discs: Truncated, flared, or warped?"

Master thesis defense: December 16th, 2020

Thesis director: Prof. John E. Beckman

Teaching assistant - Master's degree on Astrophysics of the University of La Laguna

Teaching observational techniques in Astronomy at the William Herschel Telescope (Roque de los Muchachos observatory). These classes included real observations on the 4.2m WHT telescope using the GHAFAS/Fabry-Pérot interferometer, instructing the students on how to operate the telescope in a safe, autonomous way.

Outreach talks - From school to deep space!

A cycle of outreach talks at the Alcalá school in Madrid (Spain). Teaching kids and teenagers from 8 to 17 years old about space science, astrophysics, and the path to becoming ESA and NASA scientists.

11/2011

Thermodynamics in the Science Week (Universidad Complutense de Madrid)

Voluntary guide at the laboratories of the Universidad Complutense de Madrid during the Science Week. Teaching thermodynamics to students ranging from 10 to 18 years old in a fun, practical manner, with eye-catching experiments that they could reproduce with us in the laboratory.

02/2013

AULA Education Voluntary Guide - Spanish Ministry of Education

AULA is an education fair where students are in contact with future educators and employers, like Universities, technical formation centers, research centers, and other opportunities. Guiding young students of all ages interested in STEM careers, representing the Faculty of Physics on behalf of the Universidad Complutense de Madrid.

<https://www.ifema.es/aula>

● COURSEWORK AND CERTIFICATIONS

10/06/2021 – CURRENT

EASA Part-MED Class 2 medical certificate

Certificate number: E-10112864

Document ID: AESASICOMEAE000DE3VEN26GS5JADA

Valid until: 09/06/2026

30/04/2021 – CURRENT

FAA Flight medical certificate First Class

Federal Aviation Administration of the United States of America

First Class aviation medical certificate

Examiner: Tiffany Davies, MD

Examiner designation: 000003574

Applicant ID: 2002291287

Control No: 200009495469

21/03/2021

PADI Rescue Diver certification

PADI Rescue Diver certification ID: 21030L2826

Location: Santa Clara / Monterey, California (USA)

31/03/2019

PADI Advanced Open Water Diver certification

PADI Advanced Open Water certification ID: 1904ES0173

Specialties:

- Night diver
- Wreck diver
- Deep diver

Location: Aguilas, Spain

31/03/2019

PADI Enricher Air Diver (Nitrox 40%) certification

PADI Enricher Air Diver (Nitrox 40%) certification ID: 1904ES0207

Location: Aguilas, Spain

18/03/2021

Emergency First Response - Primary & Secondary care

Primary & Secondary care. Cardiopulmonary resuscitation (CPR) Automated External Defibrillator (AED), and First Aid training.

01/10/2019 – CURRENT

Light aircraft pilot training

Ultralight aircraft pilot certification. Ongoing training. First training lights performed on a Tecnam P-92 ECHO.

<http://www.aeromancha.com/>

01/11/2016

Winter and 4x4 driving course - IAC Telescope operations

Adverse weather conditions driving course, obtained as part of the security training for the Telescope Operations Team of the Instituto de Astrofísica de Canarias and Roque de los Muchachos Observatory. Training includes driving and mechanical theory and practical driving sessions simulating ice, water, obstacles, loss/regaining control of the vehicle, etc.

21/07/2016

CMAS/FEDAS B1E Open Water Diver

CMAS B1E Open Water Diver

Wreck diving specialization

Location: Tabaiba, Canary islands (Spain)

2006 – 2014

2nd Dan black belt - Bujinkan

2nd Dan black belt in Japanese self-defense martial arts of Bujinkan.

08/09/2015 – 15/09/2015

IRAM 30m Radioastronomy Summerschool

Location: Institut de Radioastronomie Millimétrique - Pradollano (Spain)

8th IRAM 30m Radioastronomy Summerschool. Supported by a Institut de Radioastronomie Millimétrique organization grant

<https://www.iram-institute.org/EN/content-page-308-7-67-308-0-0.html>

06/2017 – 07/2017

edX Human Spaceflight course

KTH Royal Institute of Technology EDX online course dedicated to the study of several aspects of human spaceflight, including the various environmental, medical and technical challenges of space travel.

Professor: Christer Fuglesang, Director of KTH Space Center, and European Space Agency (ESA) astronaut,

Location: IAC - San Cristobal de La Laguna, Tenerife, Canary Islands (Spain)

The purpose of this workshop is to train scientists to use the James Webb Space Telescope, designing experiments and preparing applications. It is organized by the Instituto de Astrofísica de Canarias (IAC), the "The Hubble/GTC Frontier Fields Network", ESA, NASA, and JWST team at the Centro de Astrobiología.

<http://research.iac.es/congreso/JWSTWorkshop2018/index.html>

● DIGITAL SKILLS

Programming Skills

R | IDL | MATLAB | Python | C++ | IRAF | Shell | HTCondor | SQL/MYSQL | Gnuastro | PHP, HTML, CSS | Git | Arduino

Operating systems

Windows | Linux | IOs

Design

LaTeX | TinkerCAD | GIMP | Microsoft Office | Adobe Photoshop | Shotcut - video editing

● DRIVING LICENCE

Driving Licence: B

● TECHNICAL SKILLS ON ASTRONOMICAL OBSERVATORIES

Ground-based telescope experience

- Optical Ground Station (ESA)
- Gran Telescopio de Canarias (GTC) - [NEFER](#) Instrument commissioning team.
- 2.5m telescope Calar Alto (CAHA)
- William Herschel Telescope (ING) - Instrument scientist and operator of GHAFAS Fabry-Pérot Interferometer.
- SARA Kitt Peak robotic telescope.

Space telescope technical experience

- Hubble Space Telescope (Optical: ACS, Near-infrared: WFC3)
- Euclid Space Telescope (Optical: VIS detector)
- Chandra X-ray Space Telescope (X-ray imager ACIS)

● HOBBIES AND INTERESTS

3D printing

Experienced on 3D printer build, design, and printing techniques. Notable works: Design of a optical filter holder system for the Isaac Newton Telescope at the Roque de los Muchachos Astronomical Observatory (La Palma, Spain)

Scuba-diving

Experienced diver (5 years) in cold and warm waters. PADI Rescue diver certification. Nitrox Enriched diving certification. Wreck, night, and deep diving specializations.

Light aircraft pilot training

I am a student at the pilot academy Aeromancha (Toledo, Spain). At the end of my current training, I will be certified to fly light aircraft under 450 kg.

Ham-radio and satellite detection

I enjoy building and testing ham radio antennas with software defined radio systems (SDR). Notable results: Downloading NOAA weather satellite images using home-made V-dipole antenna. Detection of PicSat cube-sat from the Instituto de Astrofísica de Canarias Headquarters.

Mechanics, electronics, and home construction

One of my favorite hobbies is to improve and repair all sorts of electronic and mechanical devices (from Arduino to car engines). A personal project of mine started on 2019 is the full-renovation of a 70 year-old family house in Madrid. This included learning about wall building, plumbing, electricity installation, and other heavy construction techniques.

Running and hiking

I enjoy long hikes in the forest and mountains. Running is part of my training routine, and I participate in running events, including 10K and half-marathons.

● RESPONSIBILITIES

NASA Grant Reviewer - Future Investigators in NASA Earth and Space Science and Technology (FINESST)

Member of the peer review panel for the NASA FINESST Program, as part of the Research Opportunities in Space and Earth Sciences (ROSES). This program supports graduate student-designed projects relevant to the the Astrophysics, Earth Science, Heliophysics and Planetary Science Divisions of the Science Mission Directorate of NASA.

NASA Grant Reviewer - Astrophysics Research and Analysis (ROSES/APRA)

Member of the peer review panel for the NASA ROSES/APRA Program, The APRA program solicits basic research proposals for investigations that are relevant to NASA's programs in astronomy and astrophysics and includes research over the entire electromagnetic spectrum, gravitational waves, and particle astrophysics.

Scientific journal reviewer - ApJ, A&A

Regular scientific Reviewer for *The Astrophysical Journal* (ApJ), and *Astronomy and Astrophysics* (A&A).

06/2015

Scientific organizer of the European Week of Astronomy and Space Science (EWASS)

Scientific organizer of the European Week of Astronomy and Space Science (EWASS 06/2015)
Special Session Sp16: The outskirts of galaxies: present status and future challenges
<https://eas.unige.ch/EWASS2015/session.jsp?id=Sp16>

08/07/2019 – 12/07/2019

Local Organising Committee - International Astronomical Union Special Session 355

Member of the Local Organizing Committee at the International Astronomical Union Special Session 355, "The Realm of the Low Surface Brightness Universe"
<http://research.iac.es/congreso/iaus355/pages/organising-committees.php>

2015 – 2018

Staff organizing member of the Journal Club at the Instituto de Astrofísica de Canarias

The Journal Club is a weekly series of informal scientific talks held at the Insitituto de Astrofísica de Canarias. Staff member organizer during my Ph.D. at the IAC.