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Alejandro Borlaff

PhD student

About me Astrophysicist with background in galactic and extragalactic research. Skilled in data analysis and statistics. Large experience with observational methods and instrumentation. I have participated in more than 50 observing nights in four observatories. Aiming to participate in space science research missions.

Research experience

IAC Resident Astrophysicists PhD Programme

Oct 2014 - present
San Cristobal de la Laguna (Santa Cruz de Tenerife, Canary islands, Spain)

Studying the structure of the outskirts of galaxy discs and the low-surface brightness universe. We combine simulations, models and observations of disc galaxies with new developed methods and statistical tools to avoid systematic biases. We are developing new pipelines to improve the low-surface brightness limits of the astronomical observations (HUDF/HST). Additionally, I am deeply involved in the operations and support of the *GHAFAS*/Fabry-Pérot spectrograph at the William Herschel Telescope, which recently included the leadership of the instrument team during the successful commissioning of the adaptive optics module *AOLI* and the Fabry-Perot interferometer *NEFER* at the Gran Telescopio Canarias.

PhD supervisors: Prof. John E. Beckman (*jeb@iac.es*) & Dr. Carmen Eliche-Moral (*mceliche@fis.ucm.es*).

CEFCA Fellowship in Astrophysics Research

Jun 2014 - Sept 2014
Teruel (Aragón, Spain)

Study of the detailed morphology of more than 2000 galaxies in the ALHAMBRA survey, using rest-frame images by automated combination of the ALHAMBRA narrow-band filter system.
Project supervisor: Dr. Jesús Varela (*jvarela@cefca.es*).

Education

Master's degree on Astrophysics

Sept 2013 - Sept 2014
***Universidad Complutense de Madrid (UCM)*, Madrid**
Master's thesis: "Morphological visual classification of galaxies at cosmological distances"
Supervisors: Dr. Pablo G. Pérez-Gonzalez & Dr. Carmen Eliche-Moral.
Mark: (9.4/10)

Master's average mark: (9.07/10). Distinctions:

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

Physics (5-year) degree with specialisation in Astrophysics
Sept 2008 - Sept 2013
***Universidad Complutense de Madrid (UCM)*, Madrid**
Degree's thesis: "Antitruncated disks on lenticular galaxies formed through major mergers". Supervisors: Dra. Carmen Eliche-Moral & Prof. Jaime Zamorano Calvo. Mark: (9.5/10)

Degree's average mark: (7.8/10). Distinctions:

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

Skills

Programming languages
- Python
- R
- IDL
- MATLAB
- HTCondor
- IRAF
- Shell
- Arduino

Observing experience
- William Herschel Telescope (ING, 4.2m)
- Gran Telescopio Canarias (GTC, 10.4m)
- Optical Ground Station (ESA, 1m)
- SARA Kitt Peak 0.9m
- Calar Alto 2.5m

Data reduction pipelines
- Astrodrizzle (HST/JWST)
- ABYSS HUDF/WFC3
- Reflex (MUSE)
- GHAFAS pipeline

Data analysis tools
- Astropy
- GALFIT
- pPXF & GANDALF
- SciPy
- Gnuastro
- SExtractor

3D printing and design
- Repetier
- Slic3r
- Tinkercad

Publications in refereed journals:

I have participated in **16 scientific publications** in refereed journals, **four of them as first author**. I have **150 refereed citations** with a **h-index of 7**. In addition, we recently submitted two additional papers this year (one of them as first author). **List of selected articles:**

1. **Borlaff**, Trujillo, Román, Beckman, Eliche-Moral, Infante-Sáinz et al. The missing light of the Hubble Ultra Deep Field (A&A, submitted – arXiv:1810.00002).

2. **Borlaff**, Eliche-Moral, Beckman, Ciambur, Pérez-González, Barro, Cava & Cardiel - Evolution of the anti-truncated stellar profiles of S0 galaxies since $z = 0.6$ in the SHARDS survey: I - Sample and Methods (2017). A&A, V604, id.A119.

3. **Borlaff**, Eliche-Moral, Beckman & Font - Type-II surface brightness profiles in edge-on galaxies produced by flares (2016) - A&A V591, L7, 5

4. **Borlaff**, Eliche-Moral, Rodríguez-Pérez, Querejeta, Tapia, Pérez-González, Zamorano, Gallego, & Beckman - Antitruncated stellar discs resulting from major mergers (2014) - A&A V570, A103, 30.

Conferences, courses and traineeships:

FINCA - Finnish Centre for Astronomy with ESO visitor program fellowship (University of Oulu, 04/2018)
"Model-based pattern speed analysis of NGC 3433."
Director: Pertti Rautiainen

European Week of Astronomy and Space Science. Liverpool (UK). (EWASS 2018, 04/2018)
Poster contribution:
"Evolution of anti-truncated stellar profiles of S0 galaxies since $z = 0.6$ in the SHARDS survey."

JWST IAC Workshop - GO1 Proposal Planning (03/2018)
La Laguna, Tenerife, Canary Islands (Spain)

International Space Science Institute - "Exploring the Ultra-Low Surface Brightness Universe" meeting (11/2017)
Young Scientist invited talk:
"Looking for the missing light of the Hubble Ultra Deep Field"
ISSI international group membership
Director: David Valls-Gabaud - Bern (Switzerland)

ERASMUS+ grant. University of Oulu (06/2017 - 09/2017)
Director: Heikki Salo & Pertti Rautiainen
Invited talk:
"Understanding the outskirts of galaxies"

IAU Special Session 321 (03/2016) Formation and evolution of galaxy outskirts (Toledo)
Two posters and talk contribution (IAUS321 award, best poster).
IAU proceeding publications:
1) **Borlaff**, Eliche-Moral, Beckman, Pérez-González, Font - (2017) Evolution of the anti-truncated stellar profiles of S0 galaxies since $z = 0.6$ in the SHARDS survey. IAUS, V321, 280.
2) **Borlaff**, Eliche-Moral, Beckman, Font - (2017) Truncated disc surface brightness profiles produced by flares. IAUS, V321, 272.

Human Spaceflight - An introduction (Spring 2017)
KTH Royal Institute of Technology
EDX online course. Professor: Christer Fuglesang (ESA)

Winter and 4x4 driving course. (11/2016).
Santa Cruz de Tenerife (Spain)

IRAM 30m Radioastronomy Summerschool (09/2015)
IRAM organization scholarship grant.

European Week of Astronomy and Space Science. Tenerife (Spain). (EWASS 2015) - Scientific organizer
Poster contribution:
"Antitruncated stellar discs resulting from major mergers"

Universidad Complutense de Madrid Summerschool (07/2013)
Astrofísica del Siglo XXI: La ciencia del Universo.

Basic course on nuclear science and technology (11/2012).
Technical University of Madrid (UPM).

Outreach and organising activities

- Teaching assistant at the William Herschel Telescope (Roque de los Muchachos observatory): Observational techniques – Master's degree on Astrophysics of the University of La Laguna.
- Staff member of the Journal Club at the Instituto de Astrofísica de Canarias. IAC *Convive* award. (2015 - present)
- *At The Telescope*. Dedicated youtube channel to science communication (2016).
- 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.*
- Voluntary guide at the laboratories of the Universidad Complutense de Madrid during the Science Week (11/2011).

Languages

- Spanish - Native.
- English - Fluent speaking, writing and understanding (C1).
- Russian - Basic speaking, writing and understanding (A1).

Personal complementary information

Interests

- Astrophysics
- Space science
- Statistics
- 3D printing
- Human space exploration
- Data science
- Arduino
- Radio communications

Sports

- Scuba-diving (B1E CMAS license).
- Ninjutsu (2nd Dan black-belt).
- Running
- Hiking
- Climbing