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I specialise in observational studies of galaxy clusters and their progenitor proto-clusters. In Werner *et al.* (2021), I showed that pre-processing is an important environmental effect that quenches massive galaxies in $z \sim 1$ clusters and that some of these galaxies reside in groups. This work motivates further studies of galaxy evolution in cluster outskirts at higher redshifts, particularly in infalling groups. In Werner *et al.* (2022), using N -body simulations, I tested the performance of the PzWav cluster/group finder and identified a pure and complete sample of clusters and groups from the *S-PLUS* survey, including previously unknown systems. The same technique is being applied in *Euclid* to find overdensities. Furthermore, in Werner *et al.* (2023), I made the first measurements of intracluster stellar mass in $z \sim 2$ proto-clusters, motivating the search for intracluster light (ICL) at higher redshifts. In Werner *et al.* (in prep.), I investigate ICL formation and assembly using simulations; in particular, I find substantial ICL forming in the infall regions of galaxy proto-clusters at $2 < z < 6$, motivating observational searches for ICL in the outer regions of clusters. I have a strong scientific background in galaxy evolution in clusters and proto-clusters, and technical skills that are directly transferable to the proposed project.

Key-words: Galaxy clusters – Galaxy evolution – Galaxy infall

Research Positions

2023-Now Postdoctoral Research Associate, *Durham University*, Department of Physics, Centre for Extragalactic Astronomy and Institute for Computational Cosmology.

Education

- 2019-2023 Ph.D. in Physics, *University of Nottingham*, School of Physics and Astronomy, Thesis title: "The Evolution of Galaxies in Proto-clusters". Supervised by Prof. Nina Hatch.
- 2017-2019 M.Sc. in Astronomy, *University of São Paulo*, Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Dissertation title: "*S-PLUS* Galaxy Cluster Catalogue using PzWav". Supervised by Prof. Cláudia Mendes de Oliveira.
- 2012-2017 B.Sc. in Astronomy, *Federal University of Rio de Janeiro*, Observatório do Valongo, Emphasis on Astrophysics. Final project title: "Comparing Different Methods to Estimate Galaxy Clusters' Masses." Supervised by Prof. Paulo Lopes.

Visiting Positions

- 2024 Visitor Researcher at the Flatiron Institute (Center for Computational Astrophysics) | Scientific research about intracluster light origin and formation in collaboration with Dr. Doug Rennehan (New York).
- 2017 Visitor Researcher at University of Florida | Research on the PzWav cluster finder in collaboration with Prof. Anthony Gonzalez (Florida).
- 2013 Summer Project at California Institute of Technology | Scientific research about data visualization applied to astronomy under the supervision of Prof. George Djorgovski and Dr. Alberto Krone-Martins (California).

Awards, Scholarships & Grants

- 2025 2025 Physics Award for Excellence, *Durham University*, "for an outstanding organisation of a national meeting with over a thousand attendees with a significant aspect of community outreach, engagement with the attendees, and a strong scientific programme", Royal Astronomical Society National Astronomy Meeting Local Organiser
- 2024 LACEGAL travel grant for "Deciphering the Cosmic Code for Galaxy Formation" Workshop in Puerto Varas, Chile (£ 1,820.54), *Latinamerican Chinese European Galaxy Formation Network (LACEGAL)*
- 2024 Grant Award for Research at the Simons Foundation's Flatiron Institute (\$7,658), *Cosmology and Astroparticle Student and Postdoc Exchange Network*
- 2021 EAS fee waiver (€ 200), *European Astronomical Society Annual Meeting*
- 2019-2023 Vice-Chancellor's Scholarship for Research Excellence (3.25 years), *University of Nottingham*
- 2019 Serrapilheira Grant (R\$ 100,000.00), *Astro+ (AstroTubers, Brazilian Astronomical Society, #AstroThreadBR)*
- 2018 Certificate of Excellence in Observational Astrophysics, *University of São Paulo*
- 2017-2019 CAPES Scholarship, *Masters in Astronomy*
- 2016-2017 Scientific Initiation funded by CAPES, *Federal University of Rio de Janeiro*, Comparing Different Methods to Estimate Galaxy Clusters' Masses | Scientific research about methods to recover the masses of galaxy clusters using the Millennium Simulation, supervised by Prof. Paulo Lopes
- 2016 Honorable Mention - Astroludic, *Federal University of Rio de Janeiro*
- 2016 Best Poster at the XL Annual Meeting of the Brazilian Astronomical Society
- 2015-2016 Internship in Control and Monitoring of Geostationary Satellites, *Star One Company*
- 2015 Honorable Mention - Astroludic: Learning and Playing with Astronomy
- 2014-2015 Scholarship in Astronomy Outreach, *Federal University of Rio de Janeiro*
- 2013 Scientific Initiation Funded by CNPq, *Formation of Starburst Galaxies | Scientific research supervised by Prof. Karín Menendez-Delmestre and Prof. Thiago Signorini Gonçalves*
- 2013 Scholarship for Summer Research at California Institute of Technology
- 2012 BRAVO Challenge Award, *Brazilian Virtual Observatory*
- 2012 Scientific Initiation funded by CNPq, *Young Talents Program for Science | Project that I was selected to participate, in which it was learned about the astronomical fields*

Teaching

- 2025-Now Supervision of Kyle Ainsley | Level 4 student, *Durham University*
- 2025-Now Co-supervision of Liana Li | PhD student, *University of São Paulo*
- 2025-Now Astronomy Research-led Investigation (Second Year Physics Laboratory Demonstrator) | *Durham University, 54 hours*
- 2025 Introductory class in the course "Origins of Humanity" | Organised by Dr. Daniel Contijo, *2 hours*
- 2024-2025 Discovery Skills in Physics (First Year Physics Laboratory Demonstrator) | *Durham University, 81 hours*
- 2023-2024 Foundations of Physics 1 Tutorials | *Durham University, 80 hours*
- 2024 Masters' Degree Committee Substitute | Search for proto-clusters' candidates in the Dark Energy Survey Cosmos Deep Field, Author: Gabriel Valim Calçada, Observatório Nacional, *Invited*
- 2023 Masters' Degree Committee Substitute | Evolution of Galaxies in Supergroups of Galaxy Clusters at Low Redshift, Author: Filipe Góis da Silva, Observatório Nacional, *Invited*

- 2023 Galaxy clusters: an introduction | Introductory class for physics students of Federal University of Uberlândia, 2 hours
- 2015 Mathematics Tutor | Colégio e Curso PH
- 2012-2017 Lessons of Mathematics and Physics | Lessons for school students/private tutoring

Allocated Telescope Time

- 2024 James Webb Space Telescope, *PI: Guillaume Mahler*
Cycle 3 - survey mode. 291.2 hours
- 2019 SOAR Telescope, *PI: Stephane Werner*
18 hours

Consortium Memberships

- International Strong Lensing and Cluster Evolution Survey (*SLICE*)
- International *Dragonfly* Survey
- International Southern Photometric Local Universe Survey (*S-PLUS*)
- International Habitable Worlds Observatory (*HWO*)

Science Outreach

- 2017-Now Social Media Science Outreach
The main goal is to disseminate science, useful information about academic life and instigate critical thinking. I actively engage in science communication across multiple platforms. On Twitter (@stephanevw), I have over 100,000 followers, and my YouTube channel reaches more than 20,000 subscribers. I also share astronomy-related content on Instagram, and maintain a blog dedicated to supporting early-career astronomers, where I also discuss topics related to inclusion and equity in science. My content is in English and Portuguese.
- 2024 Celebrate Science (organised by Durham University)
- 2024 Royal Society's Summer Science on Tour at Jodrell Bank
- 2023 Article for the Brazilian Astronomical Society Magazine: Proto-clusters of Galaxies.
- 2017-2019 Youtube channel AstroTubers, founding member of the project.
- 2012-2017 School Visits with Telescopes and Inflatable Planetarium

Service to the Community

- 2023-Now Peer reviewer - Astronomy & Astrophysics, The Astrophysical Journal
- 2025 Judge of "3 minutes to inspire" competition (National Astronomy Meeting 2025) - Durham University
- 2025 Local organiser (LOC) of the National Astronomy Meeting (Royal Astronomical Society) - Durham University
- 2025 Organiser/Chair of parallel session at the National Astronomy Meeting (Royal Astronomical Society) - Durham University, "*Intracluster light: illuminating the next generation of galaxy cluster science*"
- 2025 Local organiser (LOC) of *SLICE* Meeting - Durham University, "*JWST Strong Lensing and Cluster Evolution Survey (SLICE) collaboration first meeting*"
- 2024 Organiser/Chair of parallel sessions at the National Astronomy Meeting (Royal Astronomical Society) - Hull, "*From observations to simulations: unveiling the nature of galaxy clusters*" & "*Gravitational lensing in the era of big data*"

Training

- 2025 Advanced Summer School in Galaxy Formation and Evolution, *Anargyriou & Korgialenion School of Spetses - Spetses, Greece*
Preventing Sexual Harassment, *Durham University*

- Fire Safety, *Durham University*
- Workstation Assessment, *Durham University*
- Information Security and Data Protection, *Durham University*
- 2024 Student Support at Durham, *Durham University*
- Research Integrity: Trusted Research and Export Controls, *Durham University*
- Zero Suicide Alliance (ZSA) - Suicide Awareness, *Durham University*
- 2023 Information Security and Data Protection, *Durham University*
- Equality, Diversity and Inclusion, *Durham University*

Institutional Responsibilities

- 2025-Now Group meeting organiser | Durham University
- 2025 PhD application committee | Durham University
- 2025 Astronomy National Meeting local organiser (NAM2025) | Durham University
- 2025 Astronomy Buddy Scheme - departmental mentoring program | Durham University
- 2021 Journal club organiser | University of Nottingham
- 2018-2019 Elected student representative | University of São Paulo

Skills

- Programming Python, R, $\text{\LaTeX}$, SQL
- Data analysis Optical, infrared, photometry, spectroscopy, data reduction, hydrodynamical cosmological simulations, N-body simulations
- Languages English (fluent), Portuguese (native), Spanish (basic)
- Course Machine Learning Specialization, Supervised Machine Learning: Regression and Classification; Advanced Learning Algorithms; Unsupervised Learning, Recommenders, Reinforcement Learning, by DeepLearning.AI & Stanford University
- Others IRAF, TOPCAT, Ds9, SExtractor, Lenstool (basic)

Talks/Presentations (33; 30 talks/panels + 3 posters)

- 2025
 - National Astronomy Meeting 2025 | The dawn of intracluster light in proto-clusters, *Contributed talk*
 - Strong Lensing and Cluster Evolution (*SLICE*) Survey with *JWST* First Meeting | Intracluster light formation and assembly with *SLICE*, *Pitching Science Talk*
 - From Fake News to Real Clusters: The Controversial Fate of High-z Galaxy Protoclusters (Tenerife) | The dawn of intracluster light in proto-clusters, *Invited speaker*
 - Lancaster University | The evolution of galaxies in proto-clusters, *Seminar*
- 2024
 - Friday Lunchtime Astronomy Talk (Durham University) | The evolution of galaxies in proto-clusters, *Talk*
 - European Astronomical Society Annual Meeting (Padova) | Intracluster light in the core of $z \sim 2$ galaxy proto-clusters, *Contributed Talk*
 - Harvard-Smithsonian Center for Astrophysics (AstroAI Workshop) | Using machine learning to determine galaxy membership in galaxy clusters, *Contributed Talk*
 - Princeton University | Intracluster light in the core of $z \sim 2$ galaxy proto-clusters, *Talk*
 - Yale University | Intracluster light in the core of $z \sim 2$ galaxy proto-clusters, *Talk*
 - XX Durham-Edinburgh eXtragalactic Workshop | Intracluster light in the core of $z \sim 2$ galaxy proto-clusters, *Long Talk*
- 2023
 - ESO - A Journey Through Galactic Environments (Porto Ércole) | Intracluster light in the core of $z \sim 2$ galaxy proto-clusters, *Contributed Talk*

- The First Structures of the Universe (Paris) | Intracluster light in the core of $z \sim 2$ galaxy proto-clusters, *Invited speaker*
- The 2023 Asia-Pacific Regional IAU Meeting | The Evolution of Galaxies in Proto-clusters, *Contributed Talk*
- 241st Meeting of the American Astronomical Society | The Evolution of Galaxies in Proto-clusters, *Dissertation Talk*
- 2022 ● *S-PLUS* Workshop | *S-PLUS* DR1 Galaxy Clusters and Groups Catalogue using PzWav, *Contributed Talk*
- Harvard-Smithsonian Center for Astrophysics (Galaxy Cluster Group) | Satellite Quenching was not Important at $z \sim 1$: Most Quenching Happened in the Infall Region, *Talk*
- STScI Spring Symposium | Satellite Quenching was not Important at $z \sim 1$: Most Quenching Happened in the Infall Region, *Contributed Talk*
- *S-PLUS* Environmental Working Group Meeting | *S-PLUS* DR1 Galaxy Clusters and Groups Catalogue using PzWav, *Talk*
- *S-PLUS* General Meeting | *S-PLUS* DR1 Galaxy Clusters and Groups Catalogue using PzWav, *Talk*
- 2021 ● XXXII Canary Island Winter School | Satellite Quenching was not Important at $z \sim 1$: Most Quenching Happened in the Infall Region, *Poster*
- European Astronomical Society Annual Meeting | Satellite Quenching was not Important at $z \sim 1$: Most Quenching Happened in the Infall Region, *Contributed Talk*
- ESO - Galaxy Cluster Formation II | Satellite Quenching was not Important at $z \sim 1$: Most Quenching Happened in the Infall Region, *Contributed Talk*
- Licentiate Meeting of University of São Paulo | What is the social role of scientists?, *Panel*
- Licentiate Meeting (Federal University of Rio de Janeiro) Panel | Science Outreach in Times of Scientific Denial, *Talk*
- 2018 ● IAG Science Day | Finding Galaxy Clusters Using *S-PLUS* Data, *Talk*
- Sagan Day | Science Outreach, *Panel*
- XLII Annual Meeting of the Brazilian Astronomical Society | AstroTubers: A New Way to Disseminate Science in Brazil, *Contributed Talk*
- 2017 ● Galaxy Groups and Clusters II (La Serena–Chile) | *S-PLUS* and the Study of the Large Scale Structure in the Nearby Universe, *Poster*
- 7th Week of Academic Integration of UFRJ | Efficiency of Mass Estimation of Galaxies Clusters Based on Galaxies Distribution, *Talk*
- 2016 ● XL Annual Meeting of the Brazilian Astronomical Society | Efficiency of Mass Estimation of Galaxies Clusters Based on Galaxies Distribution, *Poster*
- 2015 ● Meeting UFRJ Fair | How the Astronomy Course Works
- 2014 & 2015 ● National Science and Technology Week | Learning to View the Sky with the Inflatable Planetarium, *Talk*
- 2012 ● BRAVO Virtual Observatory School | How the availability of SOAR telescope images in Microsoft WorldWide Telescope can help Astronomy, *Invited speaker*

Publications: 16; 374 citations; h-index=6

First Author: 4; 78 citations

2025 Intracluster light in the infall region of proto-clusters
Werner et al. in prep.

- 2023 **Intracluster light in the core of $z \sim 2$ galaxy proto-clusters**
Werner *et al.* (2023). MNRAS, 523, 91; arXiv:2305.06385
- 2022 ***S-PLUS* galaxy clusters and groups catalogue using PzWav**
Werner *et al.* (2022). MNRAS, 519, 2630; arXiv:2305.06385
- 2021 **Satellite quenching was not important at $z \sim 1$: most quenching happened in the infall region**
Werner *et al.* (2021). MNRAS, 510, 674; arXiv:2111.14624

Co-authored: 9, 296 citations

- 2025 **Star Formation and Morphological Trends in the Antlia Cluster: Probing Environmental Influence out to R_{200}**
Lima-Dias *et al.* (2025). Submitted to A&A; arXiv:2503.17498
- 2025 **Catalog of Environmental Densities of galaxies in the southern hemisphere with the *S-PLUS* survey**
Lopes-Silva *et al.* (2025). Submitted to A&A; arXiv:2503.17498
- 2025 **Direct Detection of a Supermassive Black Hole Binary Creating a Stellar Core in a Giant Elliptical Galaxy**
McDonald *et al.* (2025). Submitted to Nature; arXiv:2503.17498
- 2025 **Strong Lensing and Cluster Evolution (*SLICE*) with *JWST*: Early Results, Lens Models, and High-Redshift Detections**
Cerny *et al.* (2025). Submitted to ApJ; arXiv:2503.17498
- 2025 **The *S-PLUS* Fornax Project (S+FP): Mapping emission in 77 Fornax galaxy members reaching $\sim 4 R_{\text{vir}}$**
Lopes *et al.* (2025). A&A, 699, A331; arXiv:2505.16738v1
- 2025 **The *S-PLUS* Fornax Project (S+FP): Mapping globular clusters systems within 5 virial radii around NGC 1399**
Lomeli *et al.* (2025). AJ, 169, 263; arXiv:2503.15657
- 2024 **An extended catalogue of galaxy morphology using deep learning in southern photometric local universe survey data release 3**
Bom *et al.* (2024). MNRAS, 528, 4188; arXiv:2306.08684
- 2019 **Assessing the photometric redshift precision of the *S-PLUS* survey: the Stripe-82 as a test-case**
Molino *et al.* (2019). MNRAS, 499, 3884; arXiv:1907.06315
- 2019 **The Southern Photometric Local Universe Survey (*S-PLUS*): improved SEDs, morphologies and redshifts with 12 optical filters**
C. Mendes de Oliveira *et al.* (2019). MNRAS, 489, 241; arXiv:1907.01567

Proceeding (3)

- 2025 **Habitable Worlds Observatory: Strong Lensing Constraints on Dark Matter Halo Mass Function down to $10^7 M_{\odot}$**
He *et al.* (2025). Submitted to HWO25 Proceedings
- 2025 **The dawn of intracluster light in proto-clusters**
Werner *et al.* (2025). From Fake News to Real Clusters: The Controversial Fate of High- z Galaxy Protoclusters (Tenerife) - Workshop Proceedings; DOI: 10.5281/zenodo.15496229

- 2021 **Satellite quenching was not important at $z \sim 1$: most quenching happened in the infall region**
Werner *et al.* (2021). ESO Galaxy Cluster Formation II (GCF 2021) - Virtual Workshop Proceedings; DOI: 10.5281/zenodo.4974454

References

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