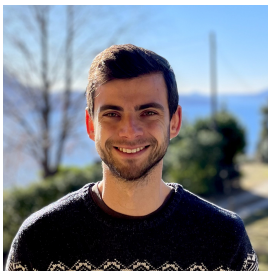
ANDREA BOLAMPERTI



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CURRENT POSITION

Research Fellow *February 2024 - present*
Max Planck Institute for Astrophysics, Garching bei München (GER)

EDUCATION

PhD in Astronomy *October 2021 - December 2024*
University of Padua, Padua (IT)
"Studying galaxy evolution through gravitational lensing"
Advisor: Dr. Anita Zanella. Co-advisors: Prof. Claudio Grillo, Dr. Joël Vernet

Masters in Physics *2019-2021*
University of Milan, 110/110 cum laude
Thesis: "Breaking the mass-sheet degeneracy in cluster lensing models with galaxy scaling relations"
Advisor: Prof. Claudio Grillo, Co-advisor: Prof. Amata Mercurio

Bachelors in Physics *2015-2018*
University of Milan
Thesis: "Measuring the total mass profile of the very massive strong lens galaxy SDSS J0100+1818"
Advisor: Prof. Claudio Grillo

RESEARCH INTERESTS

Observations – Galaxy formation and evolution – Cosmology
Strong gravitational lensing: measure the cosmological parameters and characterize both the deflectors and the sources.
High-redshift galaxies: physical properties of star-forming regions and evolution with their hosts
Properties of the circum-galactic medium: origin of the Lyα emission, geometry of the circum-galactic medium of high-z galaxies, polarization as a tool to investigate such open questions.

FELLOWSHIPS, GRANTS AND AWARDS

2025-2028 – MPA Fellowship (3 years) ($>$ 250 applicants), Max Planck Institute for Astrophysics (MPA), Garching bei München (Germany)

2023 – 20 kEUR Mini Grant Ricerca Fondamentale INAF, Co-I (4 kEUR assigned), *"Clumps at cosmological distance: revealing their formation, nature, and evolution"*, PI: F. Calura, duration: 2 years.

2022-2023 – Research studentship (1 year) at the European Southern Observatory (ESO), Garching bei München, Germany. Working on *"Measuring the polarization fraction and profile for a clumpy star-forming galaxy at $z = 3.4$"*. ESO supervisor: Joël Vernet.

FIRST-AUTHOR PEER-REVIEWED PUBLICATIONS

Bolamperti A., Chang S.-J, Vernet J., Zanella A., Gronke M., Arrigoni Battaia F., Calura F., Iani E., Vanzella E. (2025)

Constraining the geometry of the gas surrounding a typical galaxy at $z = 3.4$ with Lyα polarization, arXiv, arXiv:2502.01742.

Bolamperti A., Grillo C., Caminha G. B., Granata G., Suyu S. H., Cañameras R., Christensen L., Vernet J., Zanella A. (2024)
Cosmography from accurate mass modeling of the lens group SDSS J0100+1818: Five sources at three different redshifts, A&A, 692, A239.

Bolamperti A., Zanella A., Meštrić U., Vanzella E., Castellano M., Bergamini P., Calura F.; Grillo C., Meneghetti M., Mercurio A., Rosati P., Devereaux T., Iani E., Vernet J. (2023)
UV-continuum β slopes of individual $z \sim 2-6$ clumps and their evolution, MNRAS, 526, 5263.

Bolamperti A., Grillo C., Cañameras R., Suyu S. H., Christensen L. (2023)
Reconstructing the extended structure of multiple sources strongly lensed by the ultra-massive elliptical galaxy SDSS J0100+1818 A&A, 671, A60.

CO-AUTHOR PEER-REVIEWED PUBLICATIONS

Acebron A. et al. (15 authors, including **Bolamperti A.**) (2024), *"The Next Step in Galaxy Cluster Strong Lensing: Modeling the Surface Brightness of Multiply Imaged Sources "*, ApJ, 976, 110.

Vanzella E. et al. (41 authors, including **Bolamperti A.**) (2024), *"Extreme ionizing properties of a metal-poor, $M_{\rm UV} \simeq$ -12 star complex in the first Gigayear"*, A&A, 691, A251.

Messa M. et al. (34 authors, including **Bolamperti A.**) (2024), *"Anatomy of a z=6 Lyman-α emitter down to parsec scales: extreme UV slopes, metal-poor regions and possibly leaking star clusters"*, eprint arXiv:2407.20331.

Zanella A. et al. (18 authors, including **Bolamperti A.**) (2024), *"Unveiling [CII] clumps in a lensed star-forming galaxy at $z \sim 3.4$"*, A&A, 685, A80.

Vanzella E. et al. (34 authors, including **Bolamperti A.**) (2023), *"An extremely metal-poor star complex in the reionization era: Approaching Population III stars with JWST"*, A&A, 678, A173.

Zanella A.et al. (5 authors, including **Bolamperti A.**) (2023), *"The large molecular gas fraction of post-starburst galaxies at $z > 1$"*, MNRAS, 524, 923.

Meštrić U. et al. (18 authors, including **Bolamperti A.**) (2023), *"Clues on the presence and segregation of very massive stars in the Sunburst Lyman-continuum cluster at $z = 2.37$"*, A&A, 673, A50.

Iani E. et al. (11 authors, including **Bolamperti A.**)(2023), *"Scrutiny of a very young, metal-poor star-forming Lyα emitter at $z \approx 3.7$"*, MNRAS, 518, 5018.

AWARDED OBSERVING TIME AS PI AND RELEVANT EXPERIENCE

XMM-Newton, 15 ks, Principal Investigator (PI). *"Confirming the most distant fossil group known at $z = 0.58$"*, AO-24, 2024.

VLT/XShooter, 39 hours, Principal Investigator (PI). *"Exploring a candidate Population III clump at $z = 6.15$ and its Lyman-α emission"*, cycle 111, 2023.

VLT/MUSE, 5 hours, Principal Investigator (PI). *"The geometry of the Universe with MUSE: a rare system of three sources multiply-imaged by an ultra-massive lens galaxy"*, cycle 110, 2022.

Scientific Assistant in support of the Observing Programmes Committee (OPC), cycle 113, Nov. 2023.

Scientific Assistant in support of the Observing Programmes Committee (OPC), cycle 112, May 2023.

Reviewer of ESO proposals (P110), ESO Distributed Peer Review (DPR) paradigm, 2022.

AWARDED OBSERVING TIME AS CO-INVESTIGATOR (CO-I)

VLT/MUSE (PI: A. Acebron), 5 hours, *"A MUSE view of two rare lensing configurations to measure the Hubble constant"*, cycle 115, 2024.

ALMA (PI: A. Zanella), 8.8 hours, *"Understanding star formation quenching by investigating the gas excitation of high-redshift post-starburst galaxies"*, cycle 11, 2024.

VLT/ERIS (PI: A. Zanella), 3 hours, *"Investigating the kinematics of star-forming clumps at high-redshift"*, cycle 114, 2024.

VLT/ERIS (PI: A. Zanella), 2.5 hours, *"Investigating the kinematics of star-forming clumps at high-redshift"*, cycle 112, 2023.

VLT/ERIS (PI: A. Zanella), 2 hours, *"Investigating the kinematics of star-forming clumps at high-redshift"*, Science Verification Program, 2022.

PRESENTATIONS AY INTERNATIONAL CONFERENCES AND SELECTED SEMINARS

- Kochel Cosmic Lyman Alpha Workshop, Kochelsee, Germany. **Contributed talk**. *October 2024*
"Observational constraints to the high-z CGM geometry from Lyα spectropolarization"
- CLUSTER4, Trieste, Italy. **Contributed talk**. *September 2024*
"Cosmography from SDSS J0100+1818: a fossil group lens at intermediate redshift"
- EAS Annual Meeting 2024, SS6: Chemical evolution in the era of JWST: from stars to galaxies, Padova, Italy. **Contributed talk**. *July 2024*
"Looking for PopIII stars in high-z star-forming clumps"
- A lens on globular cluster nurseries: how to compare optimally models with observations. Sexten, Italy. **Invited talk**. *June 2024*
"Looking for PopIII stars in high-z star-forming clumps"
- Extreme galaxies in their extreme environments at extremely early epochs, Reykjavík, Iceland. **Contributed talk** *April 2024*
"Looking for PopIII stars in high-z star-forming clumps"
- ESO Galaxy Evolution Coffee, Garching bei München, Germany. Seminar. *September 2023*
"UV-continuum slopes of individual lensed clumps"
- A multi-wavelength view on globular clusters near and far, Sexten, Italy. **Invited talk**. *July 2023*
"UV-continuum slopes of individual lensed clumps: an overview and some extreme cases"
- IAU Strong gravitational lensing in the era of big data, Otranto, Italy. **Contributed talk** *June 2023*
"Extended surface brightness modeling of three sources lensed by an ultra-massive elliptical galaxy"
- Escape of Lyman radiation from galactic labyrinths, Crete, Greece. **Contributed talk**. *April 2023*
"The origin of the Lyα emission from the polarized spectrum of a star-forming high-z galaxy"
- Zoom in Observations Of Massive clusters and INfant Galaxies, Milan, Italy. Seminar. *January 2023*
"UV-continuum β slopes of individual lensed clumps: an overview and some extreme cases"
- ESO Galaxy Evolution Coffee, Garching bei München, Germany. Seminar. *January 2023*
"Strong gravitational lensing modeling: introduction and an example"
- MIAPbP Star-Forming Clumps across Cosmic Time. **Contributed flash talk**. *October 2022*
"β slopes of high-z clumps"
- Zoom in Observations Of Massive clusters and INfant Galaxies, Sexten, Italy. Seminar. *July 2022*
"Star formation rate density of lensed clumps"

ORGANIZATION OF SCIENTIFIC MEETINGS

Galaxies at Crossroads: Outflows and IMF in the VLT/ELT/ALMA/JWST Era *2023*
SOC member, Brno Planetarium (Czech Republic). ESO International Workshop selected for 2024.

"A multi-wavelength view on globular clusters near and far: from JWST to the ELT" *July 2023*
LOC member, Sexten Center for Astrophysics, Sexten, Italy

"Peer Review Under Review" *February 2023*
LOC member, ESO, Garching bei München.

"GINF: GalaxIes Near and Far" meeting co-organizer *May 2022*
Co-organizer of the "GINF: GalaxIes Near and Far" meeting. University of Padua, Padua, Italy.

COMMUNITY SERVICE AND OUTREACH

Volunteer at the European Astronomical Society (EAS) annual meeting *July 2024*
Volunteer in helping with the local organisation of the event held in Padua

ESO Journal Club Organiser *August 2023–December 2024*
Main ESO weekly meeting.

ESO Summer Student Representative *July 2023–August 2023*
Student Representative of the students of the "5th ESO Summer Research Programme".

Galaxy Evolution Coffee Organiser *May 2023–December 2023*
Topical weekly coffee at ESO that involves researchers from the Garching campus (ESO, MPA, MPE).

Astronomy for non Astronomers Organiser *March 2023–December 2023*
Monthly talk intended mainly for non-astronomers at ESO.

Chair of a MIAPbP workshop session *October 2022*
Chair of the 25th October session at the MIAPP workshop *"Star-Forming Clumps and Clustered Starbursts across Cosmic Time"*

Organizer of the CLUMPS (CLUmps and star formation in aPart galaxieS) *2022 – 2024*
A weekly journal club about high redshift galaxies and their star-forming regions, attended by researchers in Italy, Germany and the Netherlands

SCIENTIFIC VISITS

INAF Osservatorio Astronomico di Trieste (OATS), Trieste, Italy. November 2024: 1 week visit, invited by V. Strazzullo to guide the MUSE data reduction of three programs.

University of Milan, Milan, Italy. October 2024: 2 weeks visit, invited by C. Grillo.

Max Planck Institute for Astrophysics (MPA), Garching bei München, Germany. January 2024: 1 week visit, invited by G. Kauffmann.

Max Planck Institute for Astrophysics (MPA), Garching bei München, Germany. October 2021: 1 week visit, invited by S.H. Suyu

COMPUTING EXPERIENCE

I develop numerous **Python** scripts to pursue my research and to enhance the programs I use. I exploit a large number of packages for general use, including numpy, matplotlib, astropy, pandas, scipy, statsmodels, corner and emcee. The majority of the scripts I develop aim at manipulating and analyzing observation images. Thus, I am also familiar with more specific packages, like spectral_cube, pyregion, spec_utils.

I also made use of different programs, that can be divided in three main groups:

- Photometry - **GALFIT**: in all my projects, I modeled the surface brightness distribution of galaxies and measure their magnitudes and sizes. **A-PHOT**: during my PhD, I performed aperture photometry

to measure the fluxes of star-forming clumps in multiple filters. **EAZY** and **BAGPIPES**: I apply Spectral Energy Distribution (SED) fitting to the galaxies I am studying.

- Spectroscopy - **BPASS**: during my PhD, I investigate how the properties of the integrated light emitted from distant stellar populations impact on the spectral shape by generating synthetic spectra with BPASS. It is similar, but more powerful, to Sunburst99, that I also used. **pPXF**: during my Master thesis project, and in the work about strong lensing, I used pPXF to measure the velocity dispersion of early-type galaxies.

- Lensing modeling - **GLEE**: my work on strong lensing systems is based on GLEE. This program allows to model the mass distribution of deflector galaxies and reconstruct the background source. This program, developed by S. Suyu (MPA), is not publicly available and is strongly related to GLaD, one of the few codes that allow to combine strong lensing and dynamics, and that is part of my Research Project. **glafic**: a strong lensing code I used in my Bachelor thesis project. It is less powerful than GLEE, and only allows for the point-like source modeling, and is not implemented with emcee to obtain the probability distributions of the parameters. **PyLensLib**: a package to simulate gravitational lensing effects on different scales (microlensing, galaxy lensing, cluster lensing) that I am using in my current PhD project.

LANGUAGE SKILLS

Italian (Native speaker), English (Proficient), German (Basic, A1), Spanish (Basic, A2)

REFERENCES

Dr. Anita Zanella
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Dipartimento di Fisica, Università degli Studi di Milano, Via Celoria 16, I-20133 Milano, Italy.

Dr. Joël Vernet
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