Viola Gelli

Title

High-z Lyman Break Galaxies with JWST: parallel observations of dwarf satellites

Abstract

Dwarf galaxies are the most common type of galaxies in the Universe at all epochs and they play a fundamental role in cosmic history, being responsible for the build up of massive galaxies and possibly driving the reionization and metal enrichment processes. High-redshift observations of such sources are not available yet, but we demonstrate that the James Webb Space Telescope (JWST), while targeting massive Lyman Break Galaxies (LBGs), will catch for the first time the light of the faint satellite dwarf galaxies orbiting around them.

We use state-of-art cosmological simulations of a typical LBG at z=6 to uncover the properties of satellite galaxies and make predictions for the upcoming JWST observations. These dwarf galaxies cover a wide range of stellar masses ($\log(M_\star/M_\odot) \simeq 7-9$). We find that, even in such extremely dense environments, internal supernovae feedback is the key mechanism regulating their evolution, capable of completely quenching dwarf galaxies. Only the frequent merger events characterising these biased regions can effectively prolong the star-formation in the most massive satellites.

Modelling the galaxies' stellar emission we reconstruct their spectral energy distributions: these reveal how with the JWST/NIRCam instrument, through colour-magnitude diagrams, it will be possible to infer properties such as the galaxies' stellar masses and ages. The instrument's high resolution will allow us to spatially resolve these small systems from the nearby host. Thanks to JWST's high sensitivities we will detect, for the very first time, faint satellite dwarf galaxies of high-z LBGs in less than 5 hours.

Viola Gelli

Curriculum Vitae

Università degli Studi di Firenze
Physics and Astronomy Department
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Education

Nov2019-present **PhD Student**
Università degli Studi di Firenze, Florence (Italy).
Thesis: *"The stellar populations of dwarf galaxies thorugh cosmic times"*
Supervisor: Prof. Stefania Salvadori (UniFi)

2016-2019 **Master's Degree in Physics and Astrophysics**
Università degli Studi di Firenze, Florence (Italy). Curriculum: *Astrophysics*.
Final grade : 110/110 cum laude
Thesis: *"The Stellar Populations of high-redshift Dwarf Galaxies"*
Supervisor: Prof. Stefania Salvadori (UniFi)
Co-supervisor: Dr. Andrea Pallottini (Scuola Normale Superiore of Pisa)

2012-2016 **Bachelor's Degree in Physics and Astrophysics**
Università degli Studi di Firenze, Florence (Italy).
Final grade : 105/110
Thesis: *"The non-linear relation between X-Rays and UV luminosities of Quasars: a new Standard Candle"*
Supervisor: Prof. Guido Risaliti (UniFi)

2007-2012 **High School**
Liceo Linguistico IISS Piero Calamandrei, Sesto Fiorentino (FI).
Final grade: 100/100

Publications

Gelli V., Salvadori S., Pallottini A., and Ferrara A., *"The stellar populations of high-redshift dwarf galaxies"*, 2020 *MNRAS*, 498, 4134.

Gelli V., Salvadori S., Pallottini A., Ferrara A. and Carniani S. *"High-z Lyman Break Galaxies with JWST: parallel observations of dwarf satellites"*, in prep.

Conferences

6-10 Mar 2020 **Selected talk** at *First Stars VI*, Concepción (Chile).
Talk: *The stellar population of high-z dwarf galaxies*.

6-9 Jul 2020 **Contributed poster** at *SAZERAC (Summer All Zoom Epoch of Reionization Astronomy Conference)* conference, held remotely.
Poster: *Dwarf satellites of high-z Lyman Break Galaxies*.

8-14 Aug 2018 **Contributed poster** at *ICPS 2018, XXXIII International Conference of Physics Students*, Helsinki (Finland).
Poster: *Quasars: a new standard candle*.

7-14 Aug 2017 *ICPS 2017, XXXII International Conference of Physics Students*, Turin (Italy).

Awards

13 Aug 2018 I won the second prize for Best Poster Presentation during the *XXXIII International Conference of Physics Students*, Helsinki. I presented the poster *Quasars: a new standard candle*.

Schools and Seminars

27 Sep - 1 Oct 2018 **Advanced course *"Astrophysical Gas Dynamics"*** by Prof. Nick Gnedin (University of Chicacgo) at Arcetri Astrophysical Observatory.
The course gave a detailed overview on current numerical simulations of astrophysical gas dynamics, with the heavy focus towards applications in galaxy and star formation.

18-21 Jun 2018 **School *"Hands-on multi-probe mass measurements in galaxy clusters"***, Milan (Italy).
The main topics of the lectures were: strong gravitational lensing modelling, dynamical modelling, spectrophotometric analyses, X-ray analyses.
During the courses I became acquainted through practical tutorials with many useful softwares for data analysis and reduction (TOPCAT, Aladin, CIAO, HEASOFT).

15-17 Nov 2017 **GEE-5**. I attended the talks of the meeting *"Galaxy evolution and environment: observations meet simulations and theory"* at the Department of Physics and Astronomy in Arcetri (Firenze).

10 Aug 2017 **Workshop on Scientific Wrinting**. I attended the workshop *"Scientific Publishing from an Editor's Point of Wiew"* by AndreaTaroni - chief editor, Nature Physics.

Observations

Apr 2017 **TNG**. Observations at TNG Telescopio Nazionale Galileo (Roque de Los Muchachos, La Palma, Canary Islands) during the course of *Complements of Astronomy* (University of Florence). I performed imaging and low resolution spectroscopy of galaxies with the instrument *DOLORES*.

Apr 2017 **Loiano Observatory**. One night of observations at Loiano Observatory (BO) during the course of *Complements of Astronomy* (University of Florence).

Proposals

Jun 2020 Ása Skúladóttir (PI) et al. (including Viola Gelli): *4MOST survey of dwarf galaxies: 4DWARFS*

Exams and grades

Relativistic astrophysics	30/30 cum laude
High energy astrophysics	30/30
Astrophysical plasmas	30/30 cum laude
Astrophysics	30/30 cum laude
Complements of astronomy	30/30
Numerical methods for astrophysics	30/30 cum laude
Cosmology	30/30 cum laude
Cosmology II	30/30 cum laude
Physics of galaxies	30/30 cum laude
Physics of the interstellar medium	30/30 cum laude
Theoretical physics	30/30 cum laude
Atom, molecules and photons	30/30
Subnuclear physics	30/30

Languages

Italian Mother Tongue

English Fluent (speaking, writing, reading)

Spanish Advanced (reading, writing, speaking)

French Advanced (reading, writing), Intermediate (speaking)

Computer Skills

Programming Languages Python, C, Fortran, Bash-Shell (Advanced); MATLAB, C++ (Basic)

Deep Learning Keras neural network API in Python

Operating systems Mac OS X, Windows, Linux

Editing Microsoft Office (Word, Excel, PowerPoint) and LaTeX.

Additional Information

Membership Since 2017 I am a member of the International Association of Physics Students (IAPS) and the Italian Association of Physics Students (AISF). As a member of the AISF Florence local committee I often participate in the organization of various events.

Hobbies I've always been passionate about music, I started studying classical guitar at the age of 12 and I've been singing in the female choir *Menura Vocal Ensemble* since 2008.

In compliance with the Italian legislative Decree no. 196 dated 30/06/2003, I hereby authorize usage and processing of my personal details. Firenze, 18th December 2020