CURRICULUM VITAE
Eric Giunchi

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CURRENT OCCUPATION

PostDoc researcher at the Department of Physics and Astronomy at the University of Bologna since 01/02/2024. Title of the project: *Dynamical evolution of globular clusters in a cosmological framework.*

EDUCATION

- **BSc in Astronomy, *magna cum laude***, 2015-2018, Alma Mater Studiorum, University of Bologna, Italy. 20/09/2018. Title: *Structure and kinematics of the Milky Way* (Supervisor: Prof. D. Dallacasa).
- **MSc in Astrophysics and Cosmology, *magna cum laude***, 2018-2020, Alma Mater Studiorum, Università di Bologna, Italia. 25/09/2020.Title: *Looking for intermediate mass black holes in globular clusters using action-based dynamical models* (Supervisor: Prof. C. Nipoti; co-supervisor: Dr. R. Pascale).
  Link to my Master thesis: https://amslaurea.unibo.it/21272/
- **PhD in Astronomy**, 2020-2024, University of Padova. Title: *Star formation in young stellar clumps of ram-pressure stripped galaxies as seen by HST.* Supervisor: Dr. B.M. Poggianti; co-supervisors: Dr. M. Gullieuszik and Dr. A. Moretti.

PHD SCHOOLS AND WORKSHOPS

- 12-23/07/2021: International Summer School on the *Interstellar Medium of Galaxies, from the Epoch of Reionization to the Milky Way*, organized by "Le Centre pour la Communication Scientifique Directe", online-only attendance was available;
- 23/09-01/12/2021: XXXII Winter School of Astrophysics, "*Formation and evolution of galaxy clusters across cosmic time*", organized by the "Instituto de Astrofísica de Canarias" (IAC), online attendance;

- 04-21/10/2022: MIAPP (Garching, Munich) program "*Star-Forming Clumps and Starbursts across Cosmic Time*", in-person attendance, one plot presentation.

RESEARCH VISITS
- 11/04-02/06/2023: University of Minnesota, Minneapolis (MN). Collaboration with Prof. Claudia Scarlata on the study of the clumps sample completeness and bayesian fitting to the clump mass function.

INTERNATIONAL CONFERENCES
Contributed talks
- 29/08-02/09/2022. *GASP meeting*, Cagliari (CA), Italy. Title: <u>High-resolution imaging of 6 GASP ram-pressure stripping galaxies with HST</u>.
- 20-23/09/2022. *CLUSTER3*, Bologna (BO), Italy. Title: <u>High-resolution imaging of 6 GASP ram-pressure stripping galaxies with HST</u>.
- 03-07/07/2023. *A multi-wavelength view on globular clusters near and far: from JWST to the ELT*, Sexten (BZ), Italy. Title: <u>Star-forming clumps in the peculiar environment of jellyfish galaxies</u>.
- 23-27/10/2023. *GASP meeting*, New York (NY), Italy. Title: <u>Star Formation in Young Stellar Clumps of Ram-Pressure Stripped Galaxies as seen by HST</u>.

Posters
- 25-29/04/2022: 2022 Spring Symposium, *CLUSTERS 2022: Challenging Our Cosmological Perspectives Symposium Schedule*, virtual-only attendance;
- 27/06/2022-01/07/2022: *European Astronomical Society annual meeting*, Valencia;
- 26-30/06/2023: *The physics of Star Formation-From Stellar Cores to Galactic Scales*, Lyon.

PUBLICATIONS LIST
1. Gullieuszik, M.; **Giunchi, E.**; Poggianti, B. M. *and 17 more*, "*UV and Hα HST Observations of Six GASP Jellyfish Galaxies*", The Astrophysical Journal, vol. 945, no. 1, 2023. doi:10.3847/1538-4357/acb59b.
In this paper I worked on the whole data reduction of the images, developed the cosmic rays cleaning procedure and implemented the Hα-line extraction.

2. **<u>Giunchi, E.</u>**; Gullieuszik, M.; Poggianti, B. M. *and 6 more*, "HST Imaging of Star-forming Clumps in Six GASP Ram-pressure-stripped Galaxies", The Astrophysical Journal, vol. 949, no. 2, 2023. doi:10.3847/1538-4357/acc5ee.

3. Ignesti, A.; Vulcani, B.; Botteon, A., Poggianti B. M., **<u>Giunchi E.</u>** *and 5 more*, "Radio continuum tails in ram pressure-stripped spiral galaxies: Experimenting with a semi-empirical model in Abell 2255", Astronomy and Astrophysics, vol. 675, 2023. doi:10.1051/0004-6361/202346517.
In this paper I mainly worked in developing and tuning the mathematical framework to obtain the direction of the tails given the available information (Sec. 4.2.3).

4. **<u>Giunchi, E.</u>**; Gullieuszik, M.; Poggianti, B. M. *and 9 more*, "Morphology of star-forming clumps in ram-pressure stripped galaxies as seen by HST", The Astrophysical Journal, vol. 958, no. 1, 2023. doi: 10.3847/1538-4357/acfed6

5. Della Croce, A.; Pascale, R.; **<u>Giunchi, E.</u>** *and 3 more*, "The most stringent upper limit from dynamical models on the mass of a central black hole in 47 Tucanae", accepted for publication on Astronomy and Astrophysics.
https://arxiv.org/abs/2310.15221
In this paper I worked on testing the dynamical models by changing the distribution function and the available dataset, working on a set of globular cluster mock data.

6. Werle, A.; **<u>Giunchi, E.</u>**; Poggianti, B. M. *and 7 more*, "The history of star-forming regions in the tails of 6 GASP jellyfish galaxies observed with the Hubble Space Telescope", accepted for publication in Astronomy and Astrophysics. https://arxiv.org/abs/2312.06879

SCIENTIFIC SKILLS and BACKGROUND

My scientific background includes a good knowledge of state-of-art observations and models regarding the properties and driving mechanisms of the **star-formation process** and clump formation, including turbulence, stellar feedback, dynamical and stellar evolution.
I developed expertise in tracers and proxies of the properties of **star-forming clumps**, including mass, luminosity and size distribution functions; luminosity, mass and SFR-size relations; morphological evolution.
My research activity has focused on the variation of the properties of star-forming clumps across cosmic time and different environments. In particular I studied the properties of stellar clumps formed from gas stripped from cluster galaxies undergoing strong **ram-pressure stripping**, surrounded by the hot, high-pressure intracluster medium.

For my Master thesis I developed a sound knowledge of **globular clusters formation** and **evolution**, both from the stellar and dynamical point of view (mass segregation, equipartition, influence of binaries and Intermediate Mass Black Holes, three-body interactions). In addition to that, I have a good background about distribution functions for dynamical systems, including in particular **action-based distribution functions**, their properties and advantages.

SCIENTIFIC INTERESTS

- Formation and evolution of **stellar clumps**, whether they are star-forming or **globular clusters**;
- processes driving **clump formation**, especially when involving gas dynamics like turbulent cascade and stellar feedback;
- **star-formation process** as a whole, how the **environment** (at different scales, from the one surrounding the galaxy to the one surrounding the single clump) influences it and how this can be related to the evolution across cosmic time of scaling relations like the galactic SFR-stellar mass main sequence and the morphological evolution of star-forming galaxies;
- **galaxy evolution**, in particular from the dynamical point of view;
- morphological evolution of galaxies, **clump survivability** and disruption timescales, dynamical and orbital evolution of single stars.

TECHNICAL SKILLS

I have skills in **HST** photometric **data reduction** and **analysis**, development of an objective algorithm for the **detection** and **selection** of star-forming **clumps** in ram-pressure stripped galaxies (mainly using the Astrodendro software package) and capabilities in **big datasets** statistical analysis. The study of the completeness of the sample of clumps let me develop a sound knowledge in the generation of clumps **mock images** starting from intrinsic properties like mass and age, to be translated into observables like the density flux in a certain photometric filter.

I have also developed capabilities in exploring and using **MUSE datacubes**; basic knowledge of data reduction of **NIRCam** (JWST), developed during the writing an **observation proposal** (to be submitted).

For my Master thesis I developed good skills in **parallel coding** with mpi, as well as the generation of self-consistent **dynamical models** for galaxies and globular cluster via the use of action-based distribution functions.

Programming languages: *Python* (numpy, scipy, matplotlib, seaborn, astrodendro, astropy), *Astrodrizzle* (HST photometric data reduction). Basic knowledge of *Fortran90*.
Software: *galfit*, *tinytim*, *Latex*, *topcat*, *SAO DS9, agama*.

IT skills: the strong interest in computational Astrophysics led to a good ability in using computers and calculators, with a quite strong knowledge in *Linux* and *Windows* systems.

<u>Native language:</u> Italian
<u>Other languages:</u>
- C1 skills in <u>English</u> listening, reading, speaking and writing developed independently by working in team with people from many different countries and at interantional conferences, schools and workshops.
- B1 skills in <u>Spanish</u> listening, reading, speaking and writing developed independently and during high-school.

OUTREACH ACTIVITIES
- 05/2017-08/2017: guide at the Loiano telescope (Bologna, BO), developing confidence in talking in public about astronomical topics;
- 29/09/2023: science communication talk and speed talk to a public of adults and high school students;

PROFESSIONAL ACTIVITIES
- 2023: member of the Seminar organization group at the Astronomical Observatory of Padova.

<u>Other skills:</u> ability to work in group, collaborating with team mates in order to obtain the best division of tasks, essential skill in modern Astronomy. Ability to work under pressure.