ELENA LACCHIN

Institute of Theoretical Astrophysics, Zentrum für Astronomie, Universität Heidelberg
Albert-Ueberle-Straße 2, D-69120, Heidelberg, Germany
Email: elena.lacchin@inaf.it
Website: elacchin
LinkedIn: elena-lacchin

RESEARCH INTEREST

Stellar Clusters: Multiple Stellar Populations Formation - Stellar Feedback - Supernova Feedback - Rotation - Dynamical and Chemical Evolution - Star Formation in the Early Universe - Black Holes
Chemical Evolution of Galaxies: Ultra-Faint Dwarfs - Milky Way - Initial Mass Function - Nucleosynthesis - Stellar evolution - Dark Matter
Simulations: N-Body/Hydrodynamics - High Performance Computing and Parallel Computing

PRESENT POSITION

1 April 2023 - present
Postdoctoral Research Fellow
Institute of Theoretical Astrophysics, Zentrum für Astronomie, Universität Heidelberg &
Università degli Studi di Padova, Dipartimento di Fisica e Astronomia "G. Galilei"
Mentor: Prof. Michela Mapelli

EDUCATION

1 november 2019 - 30 june 2023
Ph.D. in Astrophysics
Università di Bologna, Dipartimento di Fisica e Astronomia "Augusto Righi" & Istituto Nazionale di Astrofisica - Osservatorio di Astrofisica e Scienza dello Spazio Bologna
Thesis on: "Hydrodynamic simulations of multiple stellar populations in globular clusters"
Supervisor: Dr. Francesco Calura

2 October 2017 - 20 September 2019
Master's degree in Physics - curricula Astrophysics and Cosmology
Università degli Studi di Trieste
Grade: 110/110 cum laude
Thesis on: "Chemical evolution of ultra-faint dwarf galaxies: the effects of the initial mass function"
Supervisor: Prof. Francesca Matteucci

29 September 2014 - 14 July 2017
Bachelor's degree in Physics
Università degli Studi di Trieste
Grade: 109/110
Thesis on: "Analisi dei cicli di attività solare dal 1749 al 2017"
Supervisor: Prof. Mauro Messerotti

EXPERIENCE

April - June 2022 **Visiting Student**
GEPI laboratory at the Observatoire de Paris, France
Collaborators: A. Mastrobuono-Battisti, P. Di Matteo

LIST OF PUBLICATIONS

ORCID ID: 0000-0001-9936-0126
ResearchGate: Elena-Lacchin

12. Calura F., Pascale R., Agertz O., Andersson E., **Lacchin E.**, Lupi A., Meneghetti M., Nipoti C., Ragagnin A., Rosdahl J., Vanzella E., Vesperini E., Zanella A.,"SIEGE III: The formation of dense stellar clusters in sub-parsec resolution cosmological simulations with individual star feedback", 2024, submitted.

11. Cordoni G., Casagrande L., Milone A. P., Dondoglio E., Mastrobuono-Battisti A., Jang S., Marino A. F., Lagioia E., Legnardi M. V., Ziliotto T., Muratore F., Mehta V., **Lacchin E.**, Tailo M., "Internal Dynamics of Multiple Populations in 28 Galactic Globular Clusters: A Wide-Field study with Gaia and the Hubble Space Telescope", 2024, submitted.

10. Iorio G., Torniamenti S., Mapelli M., Dall'Amico M., Trani A.A., Rastello S., Sgalletta C., Rinaldi S., Costa G., Dahl-Lahtinen B., Escobar G., Korb E., Vaccaro M.P., **Lacchin E.**, Mestichelli B., Di Carlo U.N., Spera M., Arca Sedda M., "The boring history of Gaia BH3 from isolated binary evolution", 2024, A&A 690, A144.

9. **Lacchin, E.**, "Towards a holistic view of the origin of multiple stellar populations in globular clusters", 2024, Elsevier, Procedia Computer Science, 240, 70.

8. **Lacchin E.**, Mastrobuono-Battisti A., Calura F., Nipoti C., Milone A. P., Meneghetti M., Vanzella E. ,"Multiple stellar population mass loss in massive Galactic globular clusters ", 2024, A&A 681, A45.

7. Pascale R., Calura F., Lupi A., Rosdahl J., **Lacchin E.**, Meneghetti M., Nipoti C., Vanzella E. , Vesperini E., Zanella A.,"Shaping the unseen: the influence of baryons and environment on low-mass, high-redshift dark matter halos in the SIEGE simulations ", 2023, MNRAS, 526, 1428.

6. **Lacchin E.**, Calura F., Vesperini E., Mastrobuono-Battisti A., "The role of rotation on the formation of second-generation stars in globular clusters", 2022, MNRAS, 517, 1171.

5. Calura F., Lupi A., Rosdahl J., Vanzella E., Meneghetti M., Rosati P., Vesperini E., **Lacchin E.**, Pascale R., Gilli R.,"Sub-parsec resolution cosmological simulations of star-forming clumps at high redshift with feedback of individual stars", 2022, MNRAS, 516, 5914.

4. **Lacchin E.**, Calura F., Vesperini E., "On the role of Type Ia supernovae in the second-generation star formation in globular clusters", 2021, MNRAS, 506, 5951.

3. **Lacchin E.**, Matteucci F., Vincenzo F., Palla M., "Chemical evolution of ultra-faint dwarf galaxies: testing the IGIMF", 2020, MNRAS, 495, 3276.

2. Palla M., Calura F., Matteucci F., Fan X. L., Vincenzo F., **Lacchin E.**, "The influence of a top-heavy integrated galactic IMF and dust on the chemical evolution of high-redshift starbursts", 2020, MNRAS, 494, 2355.

1. Gjergo E., Palla M., Matteucci F., **Lacchin E.**, Biviano A., Fan X. L.,"On the origin of dust in galaxy clusters at low-to-intermediate redshift", 2020, MNRAS, 493, 2782.

ACCEPTED COMPUTATIONAL PROPOSALS

Almost 17M core hours on different supercomputers, which is equivalent to ~ 600k € of research funds.

2022 **PI** of the proposal: "Towards a holistic view of the origin of multiple stellar populations in globular clusters", EuroHPC JU grant, **14M core hours** on Discoverer (BG).
2021 **PI** of the proposal: "Hydrodynamic simulations of proto-globular clusters: the role of Type Ia SNe", **2M core hours** on MARCONI 100/GALILEO 100, CINECA (IT).
2020 **CO-I** of the proposal: "Hydrodynamic simulations of the young star cluster PW1 in the Magellanic Stream" (PI: Francesco Calura), **500k core hours** on GALILEO, CINECA (IT).
2020 **PI** of the proposal: "Hydrodynamic simulations of iron-complex clusters", **500k core hours** on GALILEO, CINECA (IT).
2020 **PI** of the proposal: "Hydrodynamic simulations of Globular Clusters", **250k core hours** on MARCONI 100, CINECA (IT).

HONOURS & AWARDS

JULY 2023 **"Christine Vandemoortele for research" Prize** of 3000 € awarded by the Department of Physics and Astronomy (DIFA) "Augusto Righi" for the best PhD's thesis in astrophysics at DIFA.
OCTOBER 2022 **Travel Grant** of 500 € awarded by the MIAPbP to participate in the workshop "Star-Forming Clumps and Clustered Starbursts across Cosmic Time" in Garching, Germany.
AUGUST 2022 **Travel Grant** of 500 € awarded to partecipate to the conference "Star formation in different environments 2022" in Quy Nhon, Vietnam (not used).
JUNE 2022 **Travel Grant** of ~ 350 € awarded by the PNCG to participate to the conference "Journées scientifiques 'Galaxies' du PNCG 2022" in Strasbourg, France.
APRIL - JUNE 2022 **Grant** of 3450 € awarded by the University of Bologna for the MARCOPOLO project to work at the GEPI laboratory at the Observatoire de Paris (France) with Dr. A. Mastrobuono-Battisti on "Mass loss in Magellanic Clouds Globular Clusters".
NOVEMBER 2019 **CO-I** of the PRIN INAF "Sub-parsec resolution simulations of globular clusters in a cosmological model" (PI F. Calura, INAF-OAS), awarded ~ 66k € for 2 years.
JANUARY 2018 – SEPTEMBER 2019 **Scholarship** of 6000 € awarded by Collegio Universitario di Eccellenza "Luciano Fonda" for the master's degree.

TEACHING

Courses:
WINTER 2025 Computational Astrophysics course for PhD students at the University of Padua.

Exam commission:
2019 Oral exam examiner of Introduction to Astrophysics, Stellar Astrophysics, Stellar and Galactic Evolution at the University of Trieste (with Prof. Francesca Matteucci)

Supervision of students:
ONGOING **Co-supervisor** of the master thesis "Globular Clusters, Tidal Tails and Multiple Stellar Populations" of Isabel Calle Galán, University of Padua.

2024	**Co-supervisor** of the master thesis "Effects of Type Ia Supernova feedback in young globular clusters" of Marco Donati, University of Bologna.
Summer 2022	**Co-supervisor** of Aditya Joseph James and Keerthana Reddy Varakala at the Indiana University who worked on the visualization of hydrodynamical simulations of the formation of multiple populations in globular clusters. They have been awarded the Faculty Assistance in Data Science Grand Prize.

CONFERENCES, WORKSHOPS AND SCHOOLS

16. Contributed Talk, Heidelberg-Harvard Meeting on Star formation, Heidelberg, Germany. *December 3-6, 2024*
15. Contributed Talk, MODEST24 Exploring Dense Stellar Systems Across Cosmic Time, Warsaw, Poland. *August 19-23, 2024*
14. **Invited Talk**, A lens on globular cluster nurseries: how to compare optimally models with observations, Sexten, Italy. *June 24-28, 2024*
13. **Invited Talk**, 2024 Alpbach workshop on clouds, star clusters & black holes, Alpbach, Austria. *June 10-14, 2024*
12. **Invited Talk**, EuroHPC Summit 2024, Antwerp, Belgium. *March 19, 2024*
11. **Invited Talk**, EuroHPC User Day 2023, Brussels, Belgium. *December 11, 2023*
10. Contributed talk, STARS (Across the Universe), Naples, Italy *October 16-20, 2023*
9. **Invited Talk**, A multi-wavelength view on globular clusters near and far: from JWST to the ELT, Sexten, Italy *July 3-7, 2023*
8. Contributed talk, Ramses User Meeting 2023, Oxford, United Kingdom *April 19-21, 2023*
7. Contributed talk, Wheel of star formation, Prague, Czech Republic *September 12-16, 2022*
6. Contributed talk, Star formation in different environments 2022, Quy Nhon, Vietnam *August 21-27, 2022*
5. Contributed talk, Journées scientifiques "Galaxies" du PNCG 2022, Strasbourg, France *June 20-22, 2022*
4. Contributed talk, EuroHPC Summit Week 2022, Paris, France *March 22-24, 2022*
3. Contributed talk, The 5th Azarquiel School of Astronomy *November 15-19, 2021*
2. Contributed talk, Ramses User Meeting 2021, Paris, France *September 27-29, 2021*
1. Contributed talk, Chemical evolution of galaxies: the next 25 years, Sexten, Italy *January 7-11, 2020*

TALKS AT SEMINARS

12. **Galaxy Coffee** at MPIA Heidelberg, December, 2024
11. **Milky Way meeting** at MPA Garching, April, 2024
10. **Ghent University**, November, 2023
9. **Milky Way Group** at Observatoire de Paris-Meudon, October, 2023
8. **Star formation Group** at Heidelberg University, October, 2022
7. **Star Formation Talk** at Université Paris-Saclay, June, 2022
6. **Paris Observatory Joint Galaxies and Cosmology Seminar** at Observatoire de Paris-Meudon, April, 2022

5. **Cosmo/Astro India Group**, January, 2022 (online)
4. **Star Formation/ISM Rendezvous** at Princeton University, December 15, 2021 (online)
3. **Galfor group** at the University of Padua, December, 2021 (online)
2. **Astrochronometry seminars** at University of Bologna, November, 2021 (online)
1. **Demoblack group** at University of Padua, November, 2021 (online)

REFEREE

Referee for the major astrophysical journals.

OUTREACH AND SERVICE

2024	Interview at the EuroHPC Summit 2024.
2024	Volunteering at the Girls' day in Heidelberg.
2018	Organizing and volunteering at public physics events such as TriesteNext, Researcher Night.
2017-2019	Representative at the Physics Department Council at the University of Trieste.
2017	Volunteering, as part of the AISF (Italian Society of Physics Students), to the German Italian Physics Exchange program aimed at presenting the physics research centres in the area of Trieste.

ORGANIZATION OF CONFERENCES

2024	Splinter session on Advances in Computational Astrophysics at the Annual Meeting of the German Astronomical Society.

IT KNOWLEDGE

Operating systems: Linux/Unix (very good), Mac OS (very good), Windows (good).

Programming languages: Python (very good), Fortran 77 and 90 (very good), bash (good), IDL (good), Arduino (basic).

Astronomical softwares: Aladin, DS9, GAIA, IRAF, Muniwin, McLuster, Topcat.

Other softwares: Github (good), LaTeX (very good), Microsoft Office (very good).

Experience in parallel computing: usage of MPI and OpenMP in high-performance computing.

Codes: RAMSES (Adaptive Mesh Refinement for self-gravitating magnetized fluid flows), PeTar (N-body code)

LANGUAGE KNOWLEDGE

Italian (mother tongue), English (fluent), Spanish (basic), German (basic)