

Mario Cadelano

RTT Researcher in Stellar Astrophysics

Alma Mater Studiorum – University of Bologna
National Institute of Astrophysics - OAS

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I am a researcher in stellar astrophysics specializing in resolved stellar populations in dense star clusters through multi-wavelength observations spanning from ultraviolet to radio wavelengths. My research focuses on the formation, evolution, and dynamical properties of stellar systems, with particular emphasis on globular clusters as probes of galaxy assembly and evolution. I also investigate exotic stellar populations and compact binaries — especially neutron star binaries and millisecond pulsars — to study binary evolution, dense stellar environments, and fundamental physics under extreme conditions.

60

refereed publications

24

ADS h-index

1248

citations

6

Science/Nature papers

25

BSc/MSc/PhD students

Current Position and Research Profile

2024–present

Researcher with Tenure Track (RTT)

Alma Mater Studiorum – University of Bologna

- Research in stellar astrophysics, resolved stellar populations and dense star clusters.
- Main topics: stellar populations in extreme environments, dynamical evolution of star clusters, multiple populations, clustered star formation, binaries in star clusters, neutron-star binaries, millisecond pulsars and blue straggler stars.
- National Scientific Qualification as Associate Professor obtained in July 2024.

Professional Appointments

2021–2024

Junior Assistant Professor (RTD-A)

Alma Mater Studiorum – University of Bologna

Project: *Internal kinematic of globular clusters through a combination of proper motions and radial velocities*. Researcher in resolved stellar populations in star clusters; academic teaching duties listed below.

2021

Postdoctoral Researcher

INAF – Osservatorio di Astrofisica e Scienza dello Spazio

Project: *Globular cluster formation and early evolution: clues from their internal kinematics*. Supervisor: Dr. E. Dalessandro.

2017–2020

Postdoctoral Researcher

Alma Mater Studiorum – University of Bologna

Project: *Optical companions to binary millisecond pulsars in globular clusters*. Supervisor: Prof. B. Lanzoni.

Education

2014–2017

PhD in Astrophysics

Alma Mater Studiorum – University of Bologna

Thesis: *The exotic zoo of millisecond pulsars in globular clusters: a multi-wavelength study*. Supervisor: Prof. F. R. Ferraro. EQF level 8.

2012–2014

MSc in Astrophysics and Cosmology

Alma Mater Studiorum – University of Bologna

Final grade: 110/110 cum laude. Thesis: *La controparte ottica della Black-Widow nell'ammasso globulare M71*. Supervisor: Prof. F. R. Ferraro. EQF level 7.

2008–2012

BSc in Physics

University of Cagliari

Final grade: 104/110. Thesis: *Ricerca di pulsar nel resto di supernova DA 530*. Supervisor: Prof. N. D'Amico. EQF level 6.

Teaching

- Responsible and teacher for *General Physics T-A* (6 CFU, 60 hours) for Engineering Management, A.Y. 2022/2023, 2023/2024, 2024/2025.
- Member of the examination board for *Astrofisica Stellare*, Astronomy, A.Y. 2021/2022–2024/2025.
- Member of the examination board for *Stellar Evolution*, Astrophysics and Cosmology, A.Y. 2021/2022–2024/2025.
- Member and later President of the examination board for *General Physics T-A*, Engineering Management, A.Y. 2016/2017, 2018/2019, 2020/2021, 2022/2023–2024/2025.
- Teaching tutor for *Laboratorio di Astrofisica, Esperimentazioni di Fisica 1* and *General Physics T-A*.

Research Output and Selected Publications

72 / 60

publications / refereed

1248

ADS citations

24 / 13

total / 1st-author h-index

15 / 14 / 7

1st / 2nd / 3rd author

6

Science/Nature papers

Complete publication list available through the [ADS public library](#). Research output includes publications in *Science*, *Nature Astronomy*, *Nature Communications*, *The Astrophysical Journal*, *Astronomy & Astrophysics*, and *Monthly Notices of the Royal Astronomical Society*.

Selected recent publications

1. **Ferraro et al.** (2026), “A binary-related origin mediated by environmental conditions for blue straggler stars”, *Nature Communications*, 17, 768.
2. **Barr et al.** (2024), “A pulsar in a binary with a compact object in the mass gap between neutron stars and black holes”, *Science*, 383, 275.
3. **Cadelano et al.** (2024), “The structural properties of multiple populations in globular clusters: the instructive case of NGC 3201”, *Astronomy & Astrophysics*, 685, A158.
4. **Dalessandro et al.** (2024), “A 3D view of multiple populations’ kinematics in Galactic globular clusters”, *Astronomy & Astrophysics*, 691, A94.
5. **Cadelano et al.** (2023), “JWST uncovers helium and water abundance variations in the bulge globular cluster NGC 6440”, *Astronomy & Astrophysics*, 679, L13.

Research activities have been featured in institutional and international press releases by ESA/Hubble, INAF, University of Bologna and other research institutions.

Awarded Telescope Time and Selected Observing Proposals

24 h

JWST time

>100

HST orbits

13

JWST/HST proposals

>200 h

ground-based time

3

ESO Large Programmes

Selected awarded observing proposals

- **PI** — *The true nature of Glimpse-C01: another star cluster hosting multi-age populations?*
HST/WFC3 Proposal 17929, 3 orbits (2025)
- **Co-PI** — *Unveiling the unseen: a HST first (and only) view of extremely obscured Galactic globular clusters*
HST/WFC3 Proposal 17918, 11 orbits (2025)
- **Co-I** — *Probing the existence of dark matter halos at parsec scale with JWST*
JWST/NIRCam Proposal 5502, 19 h, PI: Ferraro (2024)

- **Co-I** — *Probing the early history of the Milky Way assembling with the chemical DNA of bulge stellar systems* VLT/CRIRES 1110.D-4239, ESO Large Programme, 135 h, PI: Ferraro (2023)
- **PI** — *The role of environment on the initial mass function of star clusters* LBT/DOLORES IT-2021B-039, 12 h (2022–2023)
- **Co-I** — *What is going on in globular cluster cores?* VLT/MUSE 1106.D-0575(B), ESO Large Programme, 145 h, PI: Ferraro (2021–2023)

Research Advising

PhD students

- Co-advisor: Greta Ettorre, Martina Loriga, Camilla Giusti, Alex Billi and Jianxing Chen.

Master students

- Advisor or co-advisor of Riccardo Magnani, Elisabetta Reggiani, Camilla Giusti, Chiara Bindi, Filippo Landini, Silvia Onorato, Luisa Pecoraro, Daniele Lattanzio, Diego Marano and Erik Iemmi.

Bachelor students

- Advisor of Riccardo Grandicelli, Filippo Frisoni, Alessandro Frizzo, Valentina Locatelli, Martina Selleri, Fabrizio Metta, Michele Ridolfi, Emma Carloni, Alessandro Bruschi, Silvia Maria Magri.

Scientific Responsibilities and International Collaborations

- Member of the **COSMIC-LAB** collaboration (PI: Ferraro), an international project aimed at investigating the interplay between stellar evolution and dynamics through the study of dense stellar systems. Main activities include photometric and kinematic characterization of star clusters, analysis of exotic stellar populations, and preparation and analysis of observations obtained with HST, JWST and ESO-VLT facilities.
- Member of the international **TRAPUM** collaboration (Transients and Pulsars with MeerKAT; PI: Kramer & Stappers), devoted to the discovery and characterization of radio pulsars with MeerKAT. Main scientific contributions focus on optical counterparts to millisecond pulsars in globular clusters and multi-wavelength follow-up observations.
- Participant in the INAF projects “Stellar clusters at the crossroad of massive structure formation and dynamical evolution” (PI: E. Dalessandro) and “La Scienza delle Pulsar negli Ammassi Globulari” (PI: A. Ridolfi).
- Scientific responsible of Work Package WP2 – Photometry and Astrometry within the PRIN 2017 project *LIGHT-ON-DARK: shedding light on the globular cluster dark side* (PI: Ferraro - PRIN- 2017K7REXT), including coordination of photometric and astrometric analyses and supervision of student activities.
- Member of the Bologna research unit of the Einstein Telescope collaboration (BoET), within the Work Package “Multi-messenger observations”.
- Scientific evaluator for HST time-allocation panels in Stellar Physics during Cycles 29 and 32, evaluator of ESO/VLT proposals during Period P114, and regular referee for *The Astrophysical Journal*, *Monthly Notices of the Royal Astronomical Society*, and *Astronomy & Astrophysics*.

Invited Talks, Conferences and Academic Service

- 6 invited colloquia and seminars, 4 invited and 11 contributed talks at national and international conferences and workshops.
- Invited speaker at national and international conferences and workshops including:
 - *Back to the Future: exploring the paths from high-redshift to local globular clusters and globular cluster systems* (Sexten Center for Astrophysics, Italy, 2026)
 - *Globular Clusters across Cosmic Time: From Local Systems to Lensed Fields and Simulations* (Bologna, Italy, 2026)
 - *The TUTT Conference* (Vlorë, Albania, 2024)
 - *Seventeenth Marcel Grossmann Meeting* (Pescara, Italy, 2024)

- Invited colloquia and seminars delivered at Heidelberg University, INAF-OAS Bologna, INAF-OACa and the Gran Sasso Science Institute (GSSI).
- Member of organizing committees for international conferences and schools, including:
 - *Back to the Future: exploring the paths from high-redshift to local globular clusters and globular cluster systems* (SOC – Sexten Center for Astrophysics, Italy, 2026)
 - *Bridging scales: star clusters and their host galaxies from the Local to the high-z Universe* (SOC – Matera, Italy, 2025)
 - IDeAS Summer Schools (SOC – 2018–2019)
 - MODEST-16 (LOC – Bologna, Italy, 2016)

Awards and Fellowships

- Fulbright Research Scholar Fellowship (2026), awarded by the U.S.-Italy Fulbright Commission to support a visiting research period in the United States. Fellowship amount: 10,000 USD.
- Marco Polo Scholarship (2016), awarded by the University of Bologna to support a research project at the National Radio Astronomy Observatory (NRAO, Charlottesville, USA).
- Certificate of Merit awarded by the Rector of the University of Bologna for being among the top students of the University in Academic Year 2013–2014.

Visiting Research Programmes

- Visiting Research Scholar at Indiana University (Bloomington, USA), April – June 2026. Host: Prof. Enrico Vesperini. Research activities focused on the dynamical evolution of high-redshift star clusters and the formation and evolution of compact-object binaries and gravitational-wave sources.
- Visiting period at the National Radio Astronomy Observatory (NRAO, Charlottesville, USA), May – July 2016. Host: Dr. Scott Ransom. Research activities focused on pulsar searches and timing analyses in globular clusters.
- Visiting period at INAF – Osservatorio Astronomico di Cagliari (Italy), July – September 2015. Hosts: Dr. Marta Burgay and Dr. Andrea Possenti. Research activities focused on pulsar searches in globular clusters.

Third Mission, Public Engagement and Community Science

Since 2016 I have been co-founder and, since 2025, President of *IDeAS – Incontri di Divulgazione e Astrofisica in Sardegna*, a non-profit organization operating at the intersection of science communication, community science, cultural production and territorial development in Sardinia.

Over the years, IDeAS evolved from a grassroots science-outreach initiative into an interdisciplinary network connecting schools, universities, research institutions, artists, cultural organizations, local administrations and local communities. Its activities use scientific culture as a tool for social inclusion, territorial engagement and community building, with particular focus on peripheral and underrepresented contexts.

Within IDeAS I coordinate and contribute to the development of public-engagement programmes, interdisciplinary science-art initiatives, educational activities, science festivals and collaborative projects involving institutions such as INAF, INFN, GSSI and the University of Cagliari.

The association has received financial support through competitive public calls, institutional collaborations and cultural partnerships, including projects funded by municipalities, research institutions and the Italian Ministry of Culture. Among these, IDeAS is partner of the interdisciplinary project *On the Edge of the Eyelid*, supported through the national *Strategia Fotografia 2024* programme.

Major initiatives include the IDeAS Summer Schools, *Scienza in Bidda*, *Cuartus de Scienza*, and *AperIDeAS*, aimed at promoting accessible and territorially rooted scientific culture through interdisciplinary and multilingual approaches.

Technical Skills and Languages

Research expertise	Multi-wavelength observational astrophysics, stellar populations, photometry, astrometry, statistical analysis, and large-scale data analysis.
Programming	Python, R, Fortran, high-performance and parallel computing.
Languages	Italian and Sardinian (native); English (full professional proficiency).