

## PERSONAL INFORMATION

## Michele Trabucchi

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Date of birth 14/12/1988 | Nationality Italian

## RESEARCH EXPERIENCE

Jan 2023 - Present

**Research Fellow (“RTDa”)**

*University of Padova [UniPd] - Department of Physics and Astronomy “Galileo Galilei”  
Vicolo dell’Osservatorio 3, I-35122 Padova, Italy*

Apr 2022 - Sep 2022

**Post-Doctoral Researcher**

*University of Padova [UniPd] - Department of Physics and Astronomy “Galileo Galilei”  
Vicolo dell’Osservatorio 3, I-35122 Padova, Italy*

Feb 2020 - Mar 2022

**Post-Doctoral Researcher**

*University of Geneva [UniGE] - Department of Astronomy  
Chemin Pegasi 51, CH-1290 Versoix, Switzerland*

Nov 2017 - Oct 2019

**Post-Doctoral Researcher**

*University of Padova [UniPd] - Department of Physics and Astronomy “Galileo Galilei”  
Vicolo dell’Osservatorio 3, I-35122 Padova, Italy*

Nov 2014 - Oct 2017

**PhD Student**

*University of Padova [UniPd] - Department of Physics and Astronomy “Galileo Galilei”  
Vicolo dell’Osservatorio 3, I-35122 Padova, Italy*

## TEACHING EXPERIENCE

Feb 2024

**Certificate: Teaching4Learning@UniPd New Faculty Course**

*University of Padova*

Course dedicated to improve the University of Padua’s study courses through **in-depth training and workshops** for professors and researchers, **innovation of teaching methodologies and strategies** with state-of-the-art **digital technologies** and initiatives to engage teachers in a shared reflection on the role and possibilities of innovative teaching.

Oct 2023 - Present

**Mentoring Activity**

*University of Padova*

**Thesis advisor and co-advisor** for the Bachelor’s Degree in Astronomy and Master’s Degree in Astrophysics and Cosmology, **project supervisor** for international exchange students.

Feb 2024 - Present

**Teacher**

*University of Padova - Bachelor’s Degree in Astronomy*

Course Unit: **“Astrophysics 2” (40 hours)**

Duties: Teacher in charge of the course unit.

Oct 2023 - Present

**Teacher**

*University of Padova - Master’s Degree in Astrophysics & Cosmology*

Course Units: **“Advanced Astrophysics” (48 hours)**

Duties: Teacher in charge of the course unit.

Feb 2023 - Sep 2023

**Teacher**

*University of Padova - Bachelor’s Degree in Biology, Bachelor’s Degree in Biotechnologies*

Course Units: **“Physics” (16 + 16 hours)**

Duties: Tutoring, organisation, supervision of physics lab experimental sessions, production of teaching material, correction and evaluation of lab reports.

- Sep 2020 - Jan 2022 **Teaching Collaborator**  
*University of Geneva - Master's Degree in Astrophysics, Bachelor's Degree in Physics*  
 Course Units: **"Astrophysics Lab I & II", "Theoretical Physics III"**  
 Duties: Single-student teaching and supervision in the development of small projects for introduction to modern astrophysical research.
- Oct 2019 - Sep 2020 **Teaching Assistant**  
*University of Padova - Master's Degree in Astrophysics & Cosmology*  
 Course Unit: **"Advanced Astrophysics" (16 hours)**  
 Duties: Frontal lectures, office hours and exam preparation/evaluation for the course module on "Stellar Pulsation & Asteroseismology".
- Oct 2018 - Sep 2019 **Teaching Assistant**  
*University of Padova - Master's Degree in Astronomy*  
 Course Unit: **"Theoretical Astrophysics" (16 hours)**  
 Duties: Frontal lectures, office hours and exam preparation/evaluation for the course module on "Stellar Pulsation & Asteroseismology".
- Oct 2015 - Sep 2016 **Teaching Assistant**  
*University of Padova - Department of Physics and Astronomy "Galileo Galilei"*  
 Course Unit: **"Theoretical Astrophysics" (8 hours)**  
 Duties: Computer lab tutoring for introduction to the computation and analysis of stellar oscillation models of red giant stars.

## PRIZES, GRANTS, FUNDINGS

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- STARS@UniPd 2023:  
 CONVERGENCE I was awarded 170'000€ through the University of Padova's **STARS@UniPd 2023** funding scheme for carrying out the project **"CONVERGENCE - CONstraining the Variability of Evolved Red Giants for ENhancing the Comprehension of Exoplanets"**. The proposed research aims at constraining mass-loss processes in evolved stars and characterising their substellar companions through their variability and pulsation.
- SNSF Grant 188697 I actively contributed to devise the research idea and to write the proposal for the project **"Long period variables as distance and age estimators in the Gaia era"**, submitted to the Swiss National Science Foundation, in strict collaboration with the main proponent, Dr. Nami Mowlavi. With funds from this successful proposal **I was then hired as a post-doctoral researcher** at the University of Geneva's Astronomical Observatory between 2020 and 2022.

## INTERNATIONAL COLLABORATIONS

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- Gaia DPAC CU7** I am a member of the *Gaia* mission Data Processing and Analysis Consortium's Coordination Unit 7 for variability processing. Within CU7, I collaborate in the **processing of data related to LPV stars**. Since 2020 (*Gaia* Data Release 3) I actively contribute to:
  - the selection, classification and characterization of LPV candidates for publication in the official *Gaia* Data Releases,
  - the preparation and maintenance of the corresponding sections of the *Gaia* documentation,
  - the analysis and validation of data for publication,
  - the writing of dedicated articles in the A&A special issues for *Gaia* Data Releases,
  - the organisation and coordination of outreach events for *Gaia* Data Releases.
 In particular, I was **responsible and main author** of the **Gaia Focused Product Release (FPR)** on radial velocity time series of long-period variable stars published in October 2023.
- Rubin - LSST I am a **Junior Associate** in the Rubin-LSST Italian scientific collaboration. I collaborate in the **production of extensive synthetic stellar population simulations** that (1) are an in-kind contribution from INAF to Rubin Obs., and (2) are being used in the definition of the observing strategy of the upcoming LSST. My primary contribution concerns the **implementation of models of LPVs and other variable stars** in the simulations, establishing a connection between two LSST official Science Collaborations of which I am part: the "Stars, Milky Way and Local Volume" collaboration and the "Transients and Variable Stars" collaboration. I am also part of the **"LSST Data Preview 0 Delegates"**, a community of selected scientists providing **technical and scientific feedback** for the Rubin Science Platform in anticipation of the beginning of operations and the income of massive amounts of observational data.

LSST Regional Collaboration	I am involved in a network of researchers from several European research institutes who hold Rubin-LSST data rights, aimed at optimising local collaborations and maximising the scientific output of the LSST survey. In particular, <b>I established a collaboration with the University of Rijeka</b> for carrying out intensive <b>hydrodynamic simulations</b> of stellar pulsation on their High-Performance Computational infrastructure “ <i>BURA</i> ”.
CONVERGENCE	I am P.I. of the <b>CONVERGENCE project</b> , funded by the <b>STARS@UniPd 2023</b> scheme. The project, started in May 2024, benefits from the support and expertise of an extended network of collaborators throughout Europe (in particular in Uppsala, Geneva, Brussels, Vienna, Rijeka) and beyond (Cape Town, Canberra, Baltimore).
PLATO Consortium	I am a member of the <b>PLATO Stellar Science Consortium, Work Package 127 “Seismic Constraints for Aging Stars”</b> , and I collaborate in the computation of stellar and adiabatic oscillation models for low-mass stars including late evolutionary stages, and computation of synthetic stellar population models.
SHoT ISSI Team	I have been involved as <b>self-supporting expert</b> in the SHoT research team (“ <i>The Stellar Path to the H0 Tension in the Gaia, TESS, LSST and JWST Era</i> ”) led by Gisella Clementini and funded by the <b>International Space Science Institute (ISSI) in Bern</b> . The team’s goal is to raise the accuracy of the astronomical distance ladder by specifically tackling uncertainties and systematics affecting stellar standard candles, and <b>I provide expertise in the context of Miras and related LPVs, and their application as distance indicators</b> .
Haydn	I have been involved in the ESA Voyage 2050 plan proposal “High-precision Asteroseismology in DeNse stellar fields” (HAYDN) as <b>responsible for the “Mass loss” Working Group</b> .
STARKEY	I have been part of the <b>ERC-funded STARKEY project</b> (P.I. Prof. Paola Marigo) at the University of Padova, aimed at the all-round calibration of models of the Thermally-Pulsing Asymptotic Giant Branch (TP- AGB) phase of stellar evolution. My tasks involved the computation, processing and analysis of <b>large sets of models of stellar pulsation</b> , a crucial process of the TP-AGB phase, and the integration of the results into the other tools and models involved in the project (such as stellar evolution and synthetic population models, and the tools for modelling mass loss). I entered the STARKEY team as a PhD student, and gradually took responsibilities within the project, such as: <b>taking charge of the Work Package 2 “Stellar pulsation”</b> ; creating and managing the <b>project website</b> ; dealing with <b>data products management</b> ; assisting with the coordination of work packages and the <b>organisation of team meetings and events</b> .
Other Memberships	I am a Junior Member of the <b>International Astronomical Union</b> , associate researcher of the Istituto Nazionale di Astrofisica’s Astronomical Observatory of Padova ( <b>INAF-OAPd</b> ).
<b>PROFESSIONAL SERVICE</b> <span style="float: right;">■</span>	
Outreach	I have given several <b>outreach talks</b> and contributed to the <b>organisation and coordination of public events</b> , in particular for the 2018, 2019, 2023 editions of the “European Researcher’s Night / Science 4 All”, and for the <i>Gaia</i> FPR, both remotely (ESAC Madrid) and on-site (INAF-OAPd). I am a <b>contributing author for MEDIA INAF’s “Universi” outreach journal</b> .
Counselling and Orientation	I have contributed to orientation activities at the University of Padova for high-school students since 2015 with the ESTAGE Project aimed actively introducing students to scientific research through simple projects. More recently I contributed to the “UniPd - Scegli con Noi” 2019, 2023 and 2024 <b>Open Days</b> , as <b>counsellor</b> and by <b>presenting the course units</b> on stellar evolution I teach for the Bachelor’s and Master’s Degree Courses at the University of Padova.
Organization of Meetings	I have been actively engaged in the <b>scientific and logistic organisation of meetings</b> since my PhD, in the context of the annual meetings held as part of the ERC-funded STARKEY project. More recently I have worked on the <b>organisation of scientific seminars and outreach events</b> (“Aperitivo con <i>Gaia</i> ”) for the <i>Gaia</i> Focused Product Release in October 2023. I am currently part of the <b>Scientific Organizing Committee of the PhD School “Frontiers of Stellar Evolution”</b> to be held in Padova for the “MWGaiaDN” Horizon Europe Marie Skłodowska-Curie Actions Doctoral Network.
Teaching Service	Since January 2023, as a member of the Teachers’ Council of the Bachelor’s Degree in Astronomy and Master’s Degree in Astrophysics and Cosmology, I carry out duties including actively participating in the <b>Council’s meetings</b> , acting as <b>outside examiner of thesis projects</b> , and taking part in <b>graduation committees</b> .
Referee	Referee for the AAS Journals, A&A, and the JAAVSO since 2019.

## CONFERENCES, SEMINARS

- Oct 2024 (upcoming) **LSST@Europe 6 – Towards LSST science, together!**  
La Palma, Spain  
**Scheduled Talk: “Modelling Long-Period Variability in Evolved Stars for Rubin-LSST”**
- Jul 2024 **EAS Annual Meeting - Symposium 4 : Gaia: The (TWO) Billion Star Galaxy Census**  
Padova, Italy  
**Talk: “The Gaia Focused Product Release Catalog of Long-Period Variable candidates”**
- Mar 2024 **Invited Seminar**  
Heidelberg, Germany - Max Planck Institute for Astronomy  
**Talk: “Long-Period Variables: Recent Developments in the Modelling and Interpretation”**
- Sep 2023 **LSST@Europe 5 – Towards LSST science, together!**  
Poreč, Croatia  
**Talk: “Simulating the pulsation of long-period variables for LSST”**
- May 2023 **30<sup>th</sup> Meeting of the Gaia DPAC Coordination Unit 7**  
Napoli, Italy  
**Invited Report: “Focused Product Release: Radial Velocities Time Series of Long-Period Variables”**
- Apr 2023 **IAU S376 – At the cross-roads of astrophysics and cosmology: Period-luminosity relations in the 2020s**  
Budapest, Hungary  
**Invited Talk: “Long-Period Variables as Distance and Age Indicators in the Era of Gaia and LSST”**
- Mar 2023 **6<sup>th</sup> Gaia DPAC Consortium Meeting**  
Heidelberg, Germany  
**Invited Report: “Gaia Focused Product Release - Epoch Radial Velocities for Long-Period Variables”**
- Oct 2022 **LSST@Europe 4 – Shaping the European Contribution to LSST**  
Roma, Italy  
**Talk: “Simulating Miras & Long-Period Variables in LSST”**
- Oct 2022 **The 2<sup>nd</sup> Regional LSST Workshop**  
Plitviče, Croatia  
**Talk: “Long-Period Variables as Distance and Age Indicators”**
- Apr 2021 **DELVE: The Death-Throes of Evolved Stars – A Virtual Encounter**  
Leuven, Belgium  
**Talk: “Advancements in the Modelling and Interpretation of Long-Period Variables”**
- Aug 2019 **Stars and their Variability Observed from Space – Celebrating the Birthday of BRITe-Constellation**  
Wien, Austria  
**Talk: “Modelling Long-Period Variables in the Gaia Era”**
- May 2019 **Invited Seminar**  
Uppsala, Sweden - Uppsala University, Department of Physics and Astronomy  
**Talk: “Long-Period Variables - Pulsating AGB Stars in the Gaia Era”**
- Aug 2018 **IAU 30<sup>th</sup> GA S343 – Why Galaxies Care About AGB Stars - A Continuing Challenge Through Cosmic Time**  
Wien, Austria  
**Talk: “Characterization of Long-Period Variables in the Magellanic Clouds”**
- Jul 2018 **Invited Seminar**  
Géneve, Switzerland - University of Geneva, Astronomical Observatory  
**Talk: “New Pulsation Models of AGB Stars - Exploiting the Potential of Long-Period Variables”**
- Jun 2018 **LSST@Europe 3 – Large Synoptic Survey Telescope - Building Science Collaborations**  
Lyon, France  
**Talk: “Long-Period Variables as Seen by LSST”**
- Sep 2017 **Stellar Populations and the Distance Scale – A Conference in Honour of Jeremy Mould**

- Beijing, China  
**Talk:** “*Characterization of Long-Period Variables in the Magellanic Clouds*”
- Nov 2016 **22<sup>nd</sup> Los Alamos Stellar Pulsation Conf. – Wide-Field Variability Surveys: a 21<sup>st</sup> Century Perspective**  
 San Pedro de Atacama, Chile  
**Poster:** “*Pulsation Models of O-rich and C-rich Long-Period Variables*”
- Jun 2016 **Cool Stars 19 – 19<sup>th</sup> Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun**  
 Uppsala, Sweden  
**Poster:** “*Theoretical K-log(P) relations for O-rich and C-rich Semi-Regular and Mira Variables*”

## SELECTED PUBLICATIONS

- **Gaia Focused Product Release: Radial velocity time series of long-period variables.**  
 Gaia Collaboration; **Trabucchi, M.**; Mowlavi, N.; Lebzelter, T.; et al. • 2023 – *A&A* 680:A36  
**Contribution:** I led the process of analysis and characterization of the data set, as well as the interpretation of the results, and had a primary role in the source selection process. I prepared the figures and wrote the manuscript with input from all authors.
- **Investigating the Long Secondary Period Phenomenon with the ASAS-SN and Gaia data.**  
 Pawlak, M.; **Trabucchi, M.**; Eyer, L. & Mowlavi, N. • 2024 – *A&A* 682:A88  
**Contribution:** I devised the strategy for distinguishing long-secondary period candidate signals from pulsation in the observational sample. I actively contributed to writing the manuscript and interpreting the results.
- **Gaia Data Release 3: The second Gaia catalogue of Long-Period Variable candidates.**  
 Lebzelter, T.; Mowlavi, N.; Lecoeur-Taïbi, I.; **Trabucchi, M.**; et al. • 2023 – *A&A* 674:A15  
**Contribution:** I contributed to the identification and characterization of the LPV candidates published in Gaia DR3, and performed the quality assessment and comparison with existing catalogues. I contributed writing the paper and preparing the figures.
- **The Period-Age relation of Long-Period Variables.**  
**Trabucchi, M.** & Mowlavi, N. • 2022 – *A&A Letter* 658:L1  
**Contribution:** I conceived, designed and implemented the research, assembled the observational data set, performed the computations and interpreted the results. I prepared the figures and wrote the manuscript with input from the co-author.
- **Semi-regular red giants as distance indicators.**  
**Trabucchi, M.**; Mowlavi, N. & Lebzelter, T. • 2022 – *A&A* 656:A66  
**Contribution:** I conceived, designed and implemented the research, assembled the observational data set, performed the computations and interpreted the results. I prepared the figures and wrote the manuscript with input from all authors.
- **Modelling long-period variables – II. Fundamental mode pulsation in the non-linear regime.**  
**Trabucchi, M.**; Wood, P. R.; Mowlavi, N.; Pastorelli, G.; Marigo, P.; et al. • 2021 – *MNRAS* 500:1575  
**Contribution:** I conceived, designed and implemented the research, performed the simulations, developed the framework for the analysis of their output, and interpreted the results. I organised data management (storage, maintenance, access). I prepared the figures and wrote the manuscript with input from all authors.
- **Carbon star formation as seen through the non-monotonic initial-final mass relation.**  
 Marigo, P.; Cummings, J. D.; Curtis, J. Lee; Kalirai, J.; Chen, Y.; Tremblay, P.-E.; Ramirez-Ruiz, E.; Bergeron, P.; Bladh, S.; Bressan, A.; Girardi, L.; Pastorelli, G.; **Trabucchi, M.**; et al. • 2020 – *Nature Astronomy* 4:1102  
**Contribution:** I provided active support and expertise with the calculation of models, the interpretation and discussion of the results, and the writing of the manuscript.
- **The onset of the AGB wind tied to a transition between sequences in the PL diagram.**  
 McDonald, I. & **Trabucchi, M.** • 2019 – *MNRAS* 484:4678  
**Contribution:** I provided the theoretical insight to interpret the data collected by the first author. I contributed actively to the presentation and discussion of the results, the writing of the manuscript and the preparation of the figures.
- **Period-luminosity diagram of long period variables in the Magellanic Clouds. New aspects revealed from Gaia Data Release 2.**  
 Lebzelter, T.; **Trabucchi, M.**; Mowlavi, N.; Wood, P. R.; Marigo, P.; et al. • 2019 – *A&A* 631:24

**Contribution:** I analysed the observational data, compared with models, and contributed to the interpretation and discussion of the results. I prepared most of the figures and I actively contributed to writing the manuscript.

- Modelling Long-Period Variables – I. A new grid of O-rich and C-rich pulsation models.**  
**Trabucchi, M.;** Wood, P. R.; Montalbán, J.; Marigo, P.; Pastorelli, G. & Girardi L. • 2019 – *MNRAS* 482:929  
**Contribution:** I developed the framework for the computation, management and analysis and the simulations. I implemented the research and interpreted the results. I organised data management (storage, maintenance, access). I prepared the figures and wrote the manuscript with input from all authors.
- A new method to identify subclasses among AGB stars using Gaia and 2MASS photometry.**  
 Lebzelter, T.; Mowlavi, N.; Marigo, P.; Pastorelli, G.; **Trabucchi, M.;** et al. • 2018 – *A&A Letter* 616:L13  
**Contribution:** I devised the approach for simulating an amplitude-selected population of Long-Period Variables for the purpose of comparing models with observations. I actively contributed to writing the manuscript and interpreting the results.
- A New Interpretation of the Period–Luminosity Sequences of Long-period Variables.**  
**Trabucchi, M.;** Wood, P. R.; Montalbán, J.; Marigo, P.; Pastorelli, G. & Girardi L. • 2017 – *ApJ* 847:139  
**Contribution:** I conceived the main idea, designed and implemented the research, performed the calculations and interpreted the results. I prepared the figures and wrote the manuscript with input from all authors.

## PERSONAL SKILLS

Research	Focused and creative, fast learner, results-oriented with care for details. I enjoy working as a team member as well as independently. I have strong initiative and am able to carry out research with a high degree of independence. I have experience with numerical computation, data analysis and interpretation, and development of tools for the automatization of such tasks.
Communication	Excellent written and verbal communication skills. Experienced and confident in public speeches and presentations at various levels: outreach, teaching and tutoring, seminars and conference talks. Skilled with remote and asynchronous communication tools for teams ( <i>Slack, Mattermost, Rocket.Chat</i> ).
Teamwork	Strong commitment to team and environment dynamics, with the ability to contribute expertise and follow leadership directives at appropriate times. Teamwork experience in both small (CONVERGENCE), medium (STARKEY), and large ( <i>Gaia</i> DPAC) collaborations.
Organization & Management	Well developed skills in prioritising, organisation, decision making, time management. Experience in the organisation and coordination of workshops and meetings.
Leadership	Sound leadership skills, developed as responsible for the STARKEY project's Pulsation Work Package, and of the publication and outreach activities for the <i>Gaia</i> Focused Product Release. I am currently employing and refining such skills as P.I of the CONVERGENCE project.

## COMPUTER SKILLS

Programming	Proficiency with <i>Python</i> and <i>Fortran</i> programming languages. Experience with object-oriented programming, version control systems ( <i>Git</i> ), database query languages ( <i>SQL, ADQL</i> ). Basic knowledge of GUI design ( <i>Python Tkinter, Matlab, Wolfram Mathematica, Java, JavaScript</i> ). Proficiency with mark-up languages <i>LaTeX</i> and <i>Markdown</i> , knowledge of <i>HTML</i> . Experience with server-based environments for computation and data analysis ( <i>jupyter</i> project tools).
Operating Systems	Proficiency with <i>GNU/Linux</i> systems and <i>Microsoft Windows</i> .
Astronomy Software	Proficiency with <i>TOPCAT</i> and <i>STILTS</i> , basic usage of <i>IRAF, DS9</i> .
Other Software	Proficiency with office suites ( <i>LibreOffice, Microsoft Office</i> ). Good experience with graphics software ( <i>GIMP, Adobe Photoshop</i> ) including vector graphics ( <i>Inkscape, Adobe Illustrator</i> ) and data visualisation ( <i>Python's matplotlib</i> package, <i>gnuplot, SM</i> ).

## LANGUAGE SKILLS

Mother tongue	Italian				
Other languages	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
Français	B2	B2	B2	B2	B1
Español	A2	B1	A2	A2	A1

Levels: A1/2: Basic user - B1/2: Independent user - C1/2 Proficient user  
 Common European Framework of Reference for Languages