Europass Curriculum Vitae

Personal information

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Research experiences

Dec. 2022 - Now	**PhD student at University of Campania "Luigi Vanvitelli"** in collaboration with **INAF - Osservatorio Astronomico d'Abruzzo** studying the dynamical evolution and multiple-populations in Globular Clusters. Supervisors: Prof. Oscar Straniero and Prof. Lucio Gialanella.
June 2022 - Nov. 2022	**Studentship at INAF - IAPS** entitled "Activity of study and formation of planetary structures, through modelling and/or remote sensing and/or laboratory data" concerning the projects "ExoMars", "Dawn" and "TRIS". Study of the numerical methods of Smoothed Particle Hydrodynamics for the simulation of hydrodynamic phenomena of interest for the mentioned projects.
Feb. 2022 - June 2022	**Internship at INAF - Astronomical Observatory of Rome**, finalized at learning the mathematical techniques of the "Information Field Theory" and their application to astronomical data, with reference to the high-contrast images produced within the SHARK-VIS project, an instrument intended for the LBT telescope for deep detection of exoplanets through direct images.

Research Interests

Stellar dynamics, collisional systems, Globular Clusters, stellar systems and populations, gravothermal catastrophe, formation, evolution and stability of self gravitating systems. I am also interested in volatiles emission from planetary surfaces, numerical methods and simulations, gravity theories, stellar formation and evolution, dark matter, planetary sciences and data analysis.

Education

16th Nov. 2021	**Master degree in Astronomy & Astrophysics, University of Rome "La Sapienza", *cum laude***. Thesis title: Gravothermal catastrophe in models of Globular Clusters with a mass distribution. Supervisor: Prof. Marco Merafina.
1st Oct. 2019	**Bachelor's degree in Physics, University of Rome "La Sapienza"**.Dissertation title: Carbon ignition curves for massive stars. Supervisor: Prof. Oscar Straniero

Publications

2024	**M. Teodori**, L. Maggioni, G. Magni, M. Formisano, "Plumes emission from a fracture on a planetary surface using a Smoothed Particle Hydrodynamics approach", in preparation.

2024 **M. Teodori**, O. Straniero, M. Merafina "Energy equipartition in Globular Clusters through the eyes of dynamical models", accepted for publication in Astronomy & Astrophysics.

2022 M. Merafina and **M. Teodori**, "Generalization of the Fokker-Planck equation for stellar orbit diffusion in multi-mass star systems".

As a co-author

2024 M. Formisano, M. C. De Sanctis, S. Boazman, A. Frigeri, D. Heather, G. Magni, **M. Teodori**, S. De Angelis, M. Ferrari, "Thermal modelling of the lunar South Pole: application to the PROSPECT landing site", Planetary and Space Science, 251, 105969.

Collaborations

Active

– Development of multi-mass dynamical models for Globular Clusters within the research group lead by Prof. Marco Merafina, concerning a research project entitled "Stellar evolution and dynamical evolution in Globular Clusters: theoretic development and N-body simulations", funded by University of Rome "La Sapienza" in 2022.

– Collaboration with INAF-IAPS on the study of volatiles emission from planetary surfaces and fractures using a Smoothed Particle Hydrodynamics (SPH) approach. Member of the International Space Science Institute (ISSI) group led by Dr. Michelangelo Formisano, for the project "Thermophysical characterization of ice-rich areas on the surface of specific planetary bodies: conditions for the formation of a transient exosphere", active in the development of SPH codes able to collaborate with Eulerian codes.

Past

– Collaboration with INAF-OAR concerning the development of codes for High Contrast Imaging in the SHARK-VIS project, finalized at the direct detection of extra-solar planets.

Funding

2024 Organization of a workshop to gather the italian expertise regarding the study of volatiles emission from planetary surfaces, to be addressed with numerical models. The workshop promotes the mobility of young researchers and PhD students and it is funded by the SISP-AC (Società Italiana di Scienze Planetarie - Angioletta Coradini).

Talks

8-13 Sept. 2024 **M. Teodori**, L. Maggioni, G. Magni, M. Formisano, M. C. De Sanctis, F. Altieri, E. D'Aversa, "Volatiles emissions from surface fractures: Enceladus' plumes through Smoothed Particle Hydrodynamics simulations", Europlanet Science Congress 2024, Berlin, Germany, 8–13 Sep 2024, EPSC2024-55.

19-21 Mar. 2024 **M. Teodori**, G. Magni, M. Formisano and L. Maggioni, "*Advancements in SPH modeling for volatiles emission*", ISSI International Team Meeting, Bern, Switzerland.

16-20 Oct. 2023 **M. Teodori**, O. Straniero, M. Merafina and L. Gialanella, "*Dynamical evolution of Multiple Populations in Globular Clusters*", STARS Across the Universe, INAF - Osservatorio Astronomico di Capodimonte, Napoli, Italy.

6-10 Feb. 2023 **M. Teodori**, G. Magni, M. Formisano, M. C. De Sanctis and F. Altieri, "*Volatiles emission from a fracture on a planetary surface: a Smoothed-Particle-Hydrodynamics approach*", XVIII Congresso Nazionale di Scienze Planetarie, Perugia, Italy.

14th Nov. 2022 **M. Teodori**, "*Multi-mass collisional stellar systems models for Globular Clusters*", G11 Workshop, Physics Department, University of Rome "La Sapienza".

Posters

19-23 Aug. 2024 — **M. Teodori**, O. Straniero and M. Merafina, "*Measuring energy equipartition in Globular Clusters with dynamical models*", MODEST-24: Exploring Dense Stellar Systems Across Cosmic Time, Nicolaus Copernicus Astronomical Center, Warsaw, Poland.

16-21 June 2024 — **M. Teodori**, G. Magni, M. Formisano, L. Maggioni, M. C. De Sanctis, F. Altieri, "*Volatiles emission from the Moon's surface: a Smoothed Particle Hydrodynamics approach*", European Lunar Symposium 2024, Dumfries and Galloway, Scotland, United Kingdom. Awarded of a Travel Grant.

8-12 May 2023 — **M. Teodori**, G. Magni, M. Formisano, M. C. De Sanctis, F. Altieri, "*Volatiles emission from a cavity on a planetary surface using smoothed particle hydrodynamics*", Biennial European Astrobiology Conference BEACON 2023, La Palma & Teneguia Princess Hotel on Fuencaliente, La Palma Island, Canary Islands, Spain. Awarded of a financial support for accommodation.

PhD schools

24 June - 5 July 2024 — Course in Computing and HPC in Astronomy & Astrophysics, Bologna, Italy.

2-6 Oct. 2023 — INAF - Scientific Communication in Astronomy School, Bertinoro, Italy.

Seminars

Held

12th June 2024 — **IAPS Seminar**, "*Smoothed Particle Hydrodynamics: simulation of volatiles emission from planetary surfaces*".

16th Feb. 2023 — **INAF-OAAb colloquia**, "*The interconnection between multi-mass dynamical models and multiple populations in Globular Clusters*".

Followed

3 Oct. 2024, 11.30 — Bologna Joint Astrophysical Colloquium, Modeling the strong-field dynamics of binary neutron star mergers, Sebastiano Bernuzzi (Friedrich-Schiller-Universität Jena).

6 June 2024, 11:30 — Bologna Joint Astrophysical Colloquium, Poetry in (proper) motion: a glimpse into the internal kinematics of globular clusters with HST, Mattia Libralato (INAF - OAPD).

7 and 14 May 2024, 10:30 — Learning GARR, Le minacce informatiche, prof. Michele Pinassi (University of Siena).

10 April 2024, 14:30 — Rome Joint Astrophysics Colloquium, Globular cluster formation and the high-redshift Universe, prof. Alvio Renzini (INAF – Osservatorio Astronomico di Padova).

18 Mar. 2024, 11:30 — Astromeeting OACN, The impact of massive stars and black holes on the dynamical evolution of star clusters, Long Wang (Sun Yat-sen University, Zhuhai Campus, China).

15 Feb. 2024, 11:30 — Bologna Joint Astrophysical Colloquium, Understanding Galaxy Formation with Dynamically Informative Metal-Poor Stars in the Milky Way, Daniela Carollo (INAF—Osservatorio Astronomico di Trieste).

30 Jan. 2024, 14:00 — INAF OAS Bologna - Astrophysics Talks, Anisotropic stellar velocities: A key factor in star cluster evolution, Václav Pavlík (Astronomical Institute of the Czech Academy of Sciences).

25 Jan. 2024, 11:00 — IAPS - Seminar, Icy satellites: a multi-scale analysis to understand their tectonics, Costanza Rossi (OAPd-INAF).

23 Jan. 2024, 11:30 — Colloquium OAR, Omega Centauri: a chemical perspective to understand its history, Deimer Antonio Alvarez Garay (University of Bologna).

15 June 2023, 11:30 — OAPD Seminar, Good practice in science talks, Roberto Decarli (INAF-OAS Bologna).

24 May 2023, 16:00 — Astroseminar, Hierarchical Black Hole Mergers: A Multi-Band Opportunity for Gravitational Waves, Giacomo Fragione (CIERA Fellow, Northwestern University, Evanston, USA).

24 May 2023, 15:00 — MoRe-ASI seminar, Let's take a look inside!, prof. Luciano Iess (Dipartimento di Ingegneria meccanica e aerospaziale, Sapienza Università di Roma).

27 April 2023, 15:00	INAF-OAAb colloquia, Active volcanism on Venus: scientific implications and future perspectives through the Project “Analogs for VENus’s GEologically Recent Surfaces” (AVENGERS), Piero d’Incecco (INAF-Osservatorio Astronomico d’Abruzzo).
20 April 2023, 11:30	INAF-OAPD seminar, Galactic Archaeology. From multiple stellar populations in star clusters to extremely metal-poor stars, Giacomo Cordoni (University of Padua).
18 April 2023, 14:30	INAF-IASF Milan colloquium, Scaling Relations: a new framework for understanding the evolution of early type galaxies, Prof. Cesare Chiosi (University of Padua).
06 April 2023, 14:00	MoRe-ASI seminar, Exploring the Ocean Worlds of the outer solar system: the search for life beyond Earth, Dr. Anezina Solomonidou(Hellenic Space Center - HSC).
04 April 2023, 11:30	INAF-OAPD seminar, The First Galaxies with JWST - Discoveries and Properties, Prof. Christopher Conselice (Manchester University).
16 March 2023, 15:00	Web-SEMINAR at OAAb, Globular Cluster formation as a runaway process, Prof. Alvio Renzini (INAF - Osservatorio Astronomico di Padova).
01 Feb. 2023, 11:00	IAPS Seminar - The multiplicity of stellar populations of Globular Clusters, Santi Cassisi (INAF-Osservatorio Astronomico d’Abruzzo).
17 Jan. 2023, 14:00	Astrophysics Talk - Galactic dynamics with Gaia DR3: A new resonance-like feature in the outer disc of the Milky Way, Shourya Khanna (INAF-Torino).
11 Jan. 2023, 11:30	Astromeeting OACN - Dust production across the Asymptotic Giant Branch ... and beyond, Paolo Ventura.
7 Dec. 2022, 11:30	Astromeeting OACN - Low surface brightness galaxy population in the Centaurus cluster from the VEGAS Survey, Nicola Bellucco (PhD student at Padova University).
28 Nov. 2022, 15:00	Seminar at Department of Physics, Sapienza University of Rome - About the Observational Check of the Mechanism of Gamma Radiation in Soft Gamma Repeaters (SGR), Prof. Bisnovatyi-Kogan (Space Research Institute, IKI, Moscow).
24 Nov. 2022, 11:30	Joint Astrophysical Colloquium - First stars and their chemical fingerprints, Stefania Salvadori (Università di Firenze).
17 Nov. 2022, 11:00	OATo Seminars - Gravity vs matter: stars as laboratory to test theories of gravity, Dr. Aneta Magdalena Wojnar (Laboratory of Theoretical Physics, Department of Theoretical Physics, Institute of Physics, University of Tartu
16 Nov. 2022, 14:30	Joint Astrophysics Colloquium - Multiple populations in Globular Clusters in the era of JWST, Prof. Antonino Milone (University of Padua).
15 Nov. 2022, 14:00	Astrophysics Talk - Galactic archaeology using chemical clocks, Giada Casali (DIFA - Unibo).
21 Oct. 2022, 10:00	Soft skills - La leadership nei contesti professionali, Career Service Sapienza & Porta Futuro Lazio.
20 Oct. 2022, 16:00	Astroseminar - Dark matter, black holes and gravitational waves, Gianfranco Bertone (GRAPPA, Amsterdam).
18 Oct. 2022, 14:00	Astrophysics Talk - On the rotation curve of disk galaxies in General Relativity, Luca Ciotti (Università di Bologna).
14 Oct. 2022, 11:00	IFPU Colloquium - Dark Matter in the Universe, Katherin Freese (University of Texas at Austin).
14 Sept. 2022, 11:00	IAPS we seminar - Volcanism on Mercury, D. Rothery (The Open University, Milton Keyenes, UK).
7 Sept. 2022, 14:30	Joint Astrophysics Colloquium - Comets as clues to the formation and evolution of planetesimals, Prof. Jurgen Blum (Technische Universität Braunschweig, German).
15 June 22, 15:30	JEDI Star Talk - The astrochemical trail from clouds to disks and planets, Ewine F. van Dishoeck (Leiden Observatory, Leiden University).
15 June 22, 14:30	Deciphering ALMA observations of protoplanetary disks Deciphering ALMA observations of protoplanetary disks, Prof. Cornelis P. Dullemond (Zentrum fürAstronomie – University of Heidelberg.)
27 April 22, 15:00-18:00	Spazio, Ultima Frontiera II Edizione - II Giornata, Sapienza Università di Roma.
13 April 22, 18:00	Masterclass | Excel, le basi: stili, gestione e organizzazione del foglio di lavoro

08 April 22, 16:00-17:00	Il tempo tra scienza e filosofia, Discovery Link Sapienza.
29 March 22, 10:00-12:00	Exploring the challenges, opportunities and the future of Space Education in Europe | European Space Policy Institute (ESPI)
08 Sept. 21, 14:00-15:00	Employabiliy Lab: Il ruolo dell'employability e delle risorse personali per la ricerca proattiva del lavoro | Sapienza Università di Roma.
23-28 April 21 e 4-7/05/21	Corso di Finanza Personale | Link Economics Sapienza Università di Roma
3 Oct. 2019, 16:00-18:00	Fisica degli Esopianeti: Progetti futuri, pianeti abitabili e biosignatures (Lezione 15) | Cattedra "Enrico Fermi" 2018/2019, Prof.ssa Giovanna Tinetti

Training courses

8 Oct. 2024	TA Springer Nature & CARE CRUI: Research Integrity
7 Oct. 2024	TA Springer Nature & CARE CRUI: How to write a scientific paper
27 Jan. 2022	Machine Learning with MATLAB, MathWorks | Training Services.
17 Jan. 2022	MATLAB Programming Techniques, MathWorks | Training Services.
15 Dec. 2021	MATLAB for Data Processing and Visualization, MathWorks | Training Services.
11 Dec. 2021	Deep Learning Onramp, MathWorks | Training Services.
09 Dec. 2021	Machine Learning Onramp, MathWorks | Training Services.
03 Dec. 2021	MATLAB Fundamentals, MathWorks | Training Services.
24 Nov. 2021	MATLAB Onramp, MathWorks | Training Services.
04 May 2021	National course of online formation, Cyber Security - basic level, INFN.
06 May 2014	European Computer Driving Licence ECDL.

Coding/software experience

Programming languages	**C** intermediate level (4 yrs, Bachelor's degree thesis and courses, PhD project), **Fortran** intermediate level (2 yrs, Master thesis, PhD project), **MATLAB** (for programming) basic level (PhD course) and **Python** intermediate level (3 yrs, INAF experiences and PhD project).
Professional skills	Basic experience (2 yr) with parallel codes: **PySPH** for hydrodynamical simulations, **MCLUSTER** and **NBODY6++** respectively for setting initial conditions and run N-body simulations of Globular Clusters.
Data analysis and visualization	Experience with **MATLAB** (6 yrs) and **Python** (3 yrs) acquired during university courses, thesis work, INAF experiences and PhD project.
Document drafting	Experience of 7 yrs with **LaTeX**, in particular for scientific reports and papers drafting.
Remote control	Basic knowledge (2 yrs) of remote connection to servers for running numerical simulation using SSH and SFTP protocol or by using a remote desktop software like AnyDesk, Splashtop and TeamViewer.
Others	Intermediate experience in **Office automation** packages, in particular with software for presentation, document elaboration and spreadsheets, refined from Italian secondary school to today (around 12 yrs experience). Basic ability in managing videoconferencing.

Teaching experiences

Tutoring	Occasional and sometimes regular tutoring of high school students in Math and Physics.
Others	Helping out with master degree thesis work of prof. Merafina students.