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**, O. Straniero, M. Merafina "Energy equipartition in Globular Clusters through the eyes of dynamical models", submitted to A&A, under-review.
2022	Merafina M. and **Teodori M.**, "Generalization of the Fokker-Planck equation for stellar orbit diffusion in multi-mass star systems" [arXiv: 2205.10209]

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", submitted to PSS, under-review.

Projects

2022 — Title: "*Stellar evolution and dynamical evolution in Globular Clusters: theoretic development and N-body simulations*", PI: Prof. Marco Merafina, Funding Institute: Sapienza Research Call 2022 - Small Projects, Role: development of multi-mass dynamical models, proposal drafting.

2023-2024 — Title: "*Thermophysical characterization of ice-rich areas on the surface of specific planetary bodies: conditions for the formation of a transient exosphere*". PI: Dr. Michelangelo Formisano. Funding Institute: International Space Science Institute (ISSI). Role: development of SPH codes for volatiles emission from planetary surfaces and subsurfaces.

Collaborations

Active

– Collaboration with INAF-IAPS for the study of volatiles emission from planetary surface and fractures using a Smoothed Particle Hydrodynamics (SPH) approach.

Past

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

Talks

8-13 Sept. 2024 (Upcoming) — **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

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.

Seminars

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*".

PhD schools

24 June - 5 July 2024	Course in Computing and High Performance Computing in Astronomy & Astrophysics, Bologna, Italy.
2-6 October 2023	INAF - Scientific Communication in Astronomy School, Bertinoro, Italy.

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 (2 yrs, INAF experiences and PhD project).
Professional skills	Basic experience (1 yr) with parallel codes: **PySPH** for hydrodynamical simulations, **MCLUSTER** and **NBODY6++/NBODY6++GPU** respectively for setting initial conditions and run N-body simulations of Globular Clusters.
Data analysis and visualization	Experience with **MATLAB** (6 yrs) and **Python** (2 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 protocols 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.