

Europass Curriculum Vitae

Personal information

Surname(s) / First name(s)

Telephone(s)

Email(s)

Work experience

Dates

Occupation or position held

Main activities and
responsibilities

Name and address of employer

Dates

Occupation or position held

Main activities and
responsibilities

Name and address of employer

Dates

Occupation or position held

Main activities and
responsibilities

Name and address of employer

Dates

Occupation or position held

Dec. 2017 - now

Postdoctoral researcher

Covariance analysis applied to the BepiColombo and MESSENGER Relativity experiments. I investigate the potentialities of the joint dataset of the two missions to test the General Relativity theory. To this aim, I developed a semi-analytical model for a covariance analysis to estimate the formal uncertainties of post-Newtonian parameters, Nordtvedt parameter η , the Sun's GM, its rate of change, and the Sun's gravitational oblateness $J_{2\odot}$. Finally, particular attention has been paid to the repercussions on the relativity experiment due to the uncertainties on the GMs and ephemerides of planets and minor bodies of the Solar System. *Winner of the "Best paper on Relativistic Metrology session award" at the 5th IEEE MetroAeroSpace conf. (Rome, 20-22 June, 2018).*

Department of mechanical and aerospace engineering. Sapienza University of Rome. In collaboration with Prof. Luciano Iess

Oct. 2016 - Dec. 2017

Postdoctoral researcher

Simulations of the geodesy measurements with the VERITAS mission to Venus. We developed a method to estimate the crustal thickness of a planet and we applied it to Venus. The gravity field anomalies of the planet are assumed to be due to the combined effect of topography and relief on the crust-mantle interface. We calculated a map of the crustal thickness of Venus and compared our results with those predicted by previous work and with the global distribution of main geological features (e.g. rift zones, tesserae, coronae). Moreover, we developed an accurate error budget for the Doppler measurements to be used in simulations for the determination of the gravity field of Venus.

Department of mechanical and aerospace engineering. Sapienza University of Rome. In collaboration with Prof. Luciano Iess

Sept. 2015 - Aug. 2016

Postdoctoral researcher

Orbit determination for space probes in the Jupiter and Saturn systems by global updating of planetary ephemerides. The work was focused on the ESA mission JUICE. We developed an hydrostatic model for the interior of Ganymede, satellite of Jupiter which is supposed to have a liquid ocean below the crust, and we performed simulations for the determination of the gravity field and the rotational state of the satellite.

Department of mechanical and aerospace engineering. Sapienza University of Rome. In collaboration with Prof. Luciano Iess

May 2013 - April 2015

Postdoctoral researcher

Main activities and responsibilities	The radioscience experiments of BepiColombo and JUNO missions. The Relativity experiment of BepiColombo will be a modern version of the traditional tests of General Relativity, based upon Mercury's perihelion advance and the relativistic light propagation near the Sun. We define the mathematical methods to be used to extract from the data of the BepiColombo mission the best constraints on the post-Newtonian parameters β , γ and the Nordtvedt parameter η , but also the gravitational oblateness of the Sun $J_{2\odot}$, the preferred frame parameters α_1 , α_2 and the rate of change in time (ζ) of the Sun's GM. We have performed a full cycle simulation of the BepiColombo radio science experiments, including this Relativity experiment, with the purpose of assessing in a realistic way the accuracy achievable on each parameter of interest. Moreover, I developed an analytical model to quantify the effects of the uncertainties on the gravitational parameters of planets and asteroids on the results of the Relativity experiment.
Name and address of employer	Department of Mathematics, University of Pisa. In collaboration with Prof. Andrea Milani
Dates	Oct. 2011 - April 2013
Occupation or position held	Postdoctoral researcher
Main activities and responsibilities	Geodesic motion with a double pendulum (PETER): Lagrangian model and disturbance estimation. In preparation for the flight of LISA-Pathfinder, a torsion pendulum is a useful tool to understand and characterize all possible sources of spurious noise that can affect the free fall of a test mass in geodesic motion. PETER is a double torsion pendulum where force-free motion has to be achieved simultaneously in two different degrees of freedom. I developed, with a Lagrangian approach, a dynamical model that describes the most significant oscillations modes of PETER and its forced motion caused by magnetic damping, tilt noise, seismic disturbances, etc.
Name and address of employer	Department of Physics, University of Rome "Tor Vergata". In collaboration with Prof. Giuseppe Pucacco and Massimo Bassan
Dates	April - Sept. 2011
Occupation or position held	Postdoctoral researcher
Main activities and responsibilities	Optimization of the LISA (Laser Interferometer Space Antenna) rendez-vous. The purpose was to semi-analytically optimize the orbital parameters of the LISA constellation in order to minimize the perturbations coming from the Earth-LISA interaction. Including non-autonomous perturbations, an estimate of Doppler shift and breathing as a function of the trailing angle have been provided. Both LISA and NGO (New Gravitational wave Observatory) configurations have been analyzed.
Name and address of employer	Department of Physics, University of Trento. In collaboration with Prof. Stefano Vitale
Dates	March 2009 - March 2011
Occupation or position held	Postdoctoral researcher
Main activities and responsibilities	Data analysis for LISA. I developed a MATLAB code to calculate the force and torque on the test mass (LISA Pathfinder mission) as a function of the time, taking into account input voltages and a Poissonian model of charge accumulation.
Name and address of employer	Department of Physics, University of Trento. In collaboration with Prof. Stefano Vitale
Dates	Oct. 2008 - Feb. 2009
Occupation or position held	Postdoctoral researcher
Main activities and responsibilities	Perturbations on the LISA orbits due to the Earth-Moon system. We calculate analytically, with a perturbative approach, the effect of the Earth-Moon system on the free-fall motion of LISA test masses. We obtain that a few harmonics of the Earth-Moon gravitational potential can be detected in the Doppler data collected by the LISA space mission and we conclude that the Earth-Moon system gravitational near field could provide an additional crosscheck to the calibration of LISA.

Name and address of employer	Department of Physics, University of Padova. In collaboration with prof. Massimo Cerdonio
Dates	Feb. - Sept. 2008
Occupation or position held	Fellow
Main activities and responsibilities	Preservation of Lascaux cave. Data from high precision thermometers, hygrometers and dew-point sensors placed into the Lascaux cave (France) have been analyzed in order to describe the stability of the microclimatic conditions of the Paleolithic paintings site.
Name and address of employer	Institute of Atmospheric Sciences and Climate (ISAC) of the Italian National Research Council (CNR) of Padova. In collaboration with Dr. Adriana Bernardi

Education and training

Dates	March 2013
Title of qualification awarded	MASTER: "Space science and technology" (Scienza e tecnologia spaziale)
Principal subjects/Occupational skills covered	The Master provides a highly qualified preparation on the scientific issues of the space exploration. The master aim at the formation of a successful professional with a poly-hedric preparation on the many aspects and interaction between the research and the business worlds.
Name and type of organization providing education and training	Department of Mathematics. University of Rome "Tor Vergata"
Level in national or international classification	2nd level Master (Italian classification)

Dates	May 23, 2008
Title of qualification awarded	Ph.D. in Astronomy. Title: <i>Variable stars and planetary transit search in super metal-rich open clusters.</i> (available at: http://paduaresearch.cab.unipd.it/920/)
Principal subjects	My PhD thesis presents the analysis of a large sample of photometric data relative to the super metal-rich open clusters NGC6791 and NGC6253. The main goal of the surveys was the search for extrasolar planets using the transits method. I contributed to the extrasolar planet search by making numerical simulations in order to estimate the number of expected transiting planets. Moreover, I analyzed the entire sample of light curves in order to find variable stars. I discovered 260 new variable stars in the field of NGC6791 and 597 in the field of NGC6253. The classification of all variables is presented and discussed in this work.
Name and type of organization providing education and training	Department of Astronomy, University of Padova.

Dates	July 22, 2004
Title of qualification awarded	Master's degree in Astronomy. Title: <i>Search and analysis of blue straggler stars in galactic open clusters.</i> Grade: 106/110
Principal subjects	Photometric data for 216 clusters were collected from the literature and 2782 blue stragglers stars (BSS) candidates were extracted from 76 of them. I found that the anticorrelation of BSS frequency vs. total magnitude identified in similar studies conducted on Galactic globular clusters extends to the open cluster regime: clusters with smaller total magnitude tend to have higher BSS frequencies. Moreover, a clear correlation between the BSS frequency and the age of the clusters was found. A simple model is developed here to try to explain this last and new result. The model allows us to ascertain the important effect played by mass loss in the evolution of open clusters.

Name and type of organization providing education and training	Department of Astronomy, University of Padova.
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Dates	July 1997
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Title of qualification awarded
Name and type of organization
providing education and training

Mother tongue(s)
Other language(s)

*Self-assessment
European level^(*)*

English

French

Technical skills and
competences

Computer skills and
competences

Driving licence(s)

Teaching experiences

Dates
Position held
Course

Dates
Position held
Course

Dates
Position held
Course

Additional information

H-Index
citations
co-authors

High school graduation

Scientific High School "F. Severi" in Lido di Venezia (Venice, Italy)

Italian

English, French

Understanding		Speaking				Writing			
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient user	C2	Proficient user	C1	Proficient user	C1	Proficient user	C1	Proficient user
B2	Independent user	C2	Proficient user	B2	Independent user	B2	Independent user	B2	Independent user

^(*) Common European Framework of Reference (CEF) level

Lagrangian mechanics, celestial mechanics (perturbation theory, orbit determination). Data analysis: nonlinear least squares, signal extraction from time series data, frequency-domain analysis. Analysis of astronomical (photometric) data.

Very good knowledge in computer programming languages Fortran 77/90. Good knowledge in MATLAB. Excellent knowledge in *Mathematica* software.

Category B. Motor vehicles.

Feb. 2010 - Jul. 2010

Graduate teaching assistant

General Physics 1 at the Faculty of Engineering (Laurea Triennale Civile e Ambientale) of Trento (Prof. S. Vitale)

Oct. 2008 - Jan. 2009

Teaching fellow

Calculus (Analisi Matematica 1) at the Faculty of Agriculture Sciences (Laurea Triennale in Riassetto del Territorio e Tutela del Paesaggio) of Padova.

Mar. - Jun. 2007

Graduate teaching assistant

Course: General Physics 1 at the Faculty of Agriculture Sciences (Laurea Triennale in Biotecnologie agrarie) of Padova

Meetings and conferences

5th IEEE International workshop on Metrology in Aerospace - Roma, Italy, 20-22 June 2018. As relator (and author): *Covariance analysis applied to the MESSENGER and BepiColombo Relativity experiments*. Winner of the Best paper on Relativistic Metrology session award.

2017 AGU Fall Meeting - New Orleans, USA, 11-15 December 2017. As author of the poster: *An approach to the crustal thickness inversion problem*.

PSG Cassini Meeting - Pasadena, USA, 11-15 September 2017.

BepiColombo 14th Science Working Team Meeting - Tokyo, Japan, 7-10 November 2016. As relator (and author): *Discussion on the cruise tests of GR*.

V Italian-Pakistani workshop on Relativistic Astrophysics - Lecce, Italy, 22-23 July 2016. As relator (and author): *Space tests of the strong equivalence principle: BepiColombo Radioscience experiment and the Earth-Sun Lagrangian points opportunity*.

XII Congresso Nazionale di Scienze Planetarie - Bormio (SO) Italy, 2 - 6 February 2-6, 2015. As co-author: *The Radioscience Experiment with BepiColombo mission to Mercury*.

Complex Planetary Systems - IAU Symposium - University of Namur, Belgium. July 7-11, 2014. As relator (and author): *Testing the Strong Equivalence Principle with BepiColombo mission*.

JUNO Science Team Meeting - Boulder (CO), USA, 24-28 March 2014.

CELMEC VI - The Sixth International Meeting on Celestial Mechanics. San Martino al Cimino, Viterbo (Italy). September 1-7, 2013.

First AstroNet-II Training School: "Astrodynamics of natural and artificial satellites: from regular to chaotic motions". January, 14-17 2013, University of Roma "Tor Vergata".

9th LISA Symposium. May 21-25, 2012, BnF-Paris. As relator (and author): *Analytic model for the Rototranslational Torsion Pendulum* (Parallel session - Other experiments).

38th COSPAR Scientific Assembly. 18-25 July 2010, in Bremen, Germany. As author: *Data analysis for LISA and LISA-Pathfinder*. Symposium H, session 3, paper number H03-0021-10 (Oral). As co-author:

1. *Femto-Newton level testing of free-fall on-ground*. Symposium H, session 3, paper number H03-0012-10 (Oral)
2. *Testing of the LISA pathfinder GRS*. Symposium H, session 3, paper number H03-0010-10 (Oral)

CELMEC V - The Fifth International Meeting on Celestial Mechanics. San Martino al Cimino, Viterbo (Italy). September 6-12, 2009. As author: *Estimate of the gravitational effects of the Earth-Moon system on the breathing of the LISA constellation*.

Scuola Nazionale di Astrofisica: "Oggetti compatti e Pulsar - Scienza con ALMA". Cagliari, May 20-26, 2007.

Scuola Nazionale di Astrofisica: "Ammassi di galassie - Plasmi astrofisici". Trieste
October 1-6, 2006.

Summer School: "Physics of the Interstellar Medium". International Max Planck
Research School for Astronomy and Cosmic Physics at the University of Heidelberg.
September 25-29, 2006

Scuola Nazionale di Astrofisica: "Dinamica delle galassie - Nuclei galattici attivi".
Bertinoro (Italy). May 7-12, 2006