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CLAUDIO PARIS
Curriculum Vitae
ai fini della pubblicazione

Place Rome
Date 29/09/2021

Part I – General Information

Full Name	Claudio Paris
Spoken Languages	Italian, English

Part II – Education

Type	Year	Institution	Notes (Degree, Experience,…)
Specialty	2017	Sapienza Università di Roma, Scuola di Ingegneria Aerospaziale	Special Master Degree in Aerospace Engineering – Laurea a statuto speciale. Cum Laude. Defending the thesis “Optical Performances of the LARES Satellite”
PhD	2015	Sapienza Università di Roma	PhD in Aerospace Engineering. Defending the thesis “Research activities on LARES mission: from design and qualification to launch and preliminary results”
University graduation	2006	Sapienza Università di Roma	Master of Science in Aerospace Engineering (Laurea Vecchio Ordinamento). Defending the thesis: “Test preliminari per la realizzazione di un sensore in fibra ottica per alte temperature e prove dinamiche con sensori FBG”

Part III – Appointments

IIIA – Academic Appointments

Start	End	Institution	Position
2018	2021	Centro Ricerche Enrico Fermi	Ricercatore Tempo Determinato. Progetto “Fisica Fondamentale ed Esperimenti nello Spazio”
2015	2018	Centro Ricerche Enrico Fermi	Assegno di Ricerca. Progetto “Fisica Fondamentale ed Esperimenti nello Spazio”
2014	2015	Sapienza Università di Roma. Dipartimento DIAEE	Assegno di ricerca. Argomento: "Studio delle perturbazioni non gravitazionali sull'orbita del satellite LARES."
2011	2014	Sapienza Università di Roma. Dipartimento DIAEE	Assegno di ricerca. Argomento: "Studio degli effetti termici sui componenti del satellite LARES; supporto alle attività di qualifica e integrazione di LARES e del sistema di separazione; supporto al design e ai test del sistema di separazione di LARES. Test ottici in termovuoto di componenti del satellite LARES."
2009	2011	Sapienza Università di Roma, Scuola di Ingegneria Aerospaziale	Assegno di ricerca. Argomento: “Studio degli effetti termici sui componenti del satellite LARES; supporto alle attività di qualifica e integrazione di LARES e del sistema di separazione; supporto al design e ai test del sistema di separazione di LARES. Test ottici in termovuoto di componenti del satellite LARES.”

IIIB – Other Appointments

Start	End	Institution	Position
2021	2030	Ministero dell’Istruzione, Università e Ricerca	Abilitazione scientifica nazionale alle funzioni di professore di seconda fascia di cui all'articolo 16 della legge 30 dicembre 2010, n. 240 per il Settore concorsuale 09/A1 conseguita in data 10/05/2021, nella tornata 2018-2020, sesto quadrimestre.
2013	2015	ACE srl (per GCF Generale Costruzioni Ferroviarie spa)	Contratto a progetto part-time per la realizzazione di un sistema di monitoraggio con sensori FBG in ambito ferroviario.
2011	2011	Centro Ricerche Progetto San Marco-	Contratto di prestazione d’opera tra CRPSM e ACE srl per installazione di sensori in fibra ottica FBG su ferrovie,

		CRPSM, Sapienza Università di Roma	imbarcazioni, impianti industriali; ricerca e sviluppo per sistemi di misura basati principalmente su sensori FBG.
2007	2009	Istituto Nazionale di Fisica Nucleare, INFN; European Organization for Nuclear Research, CERN.	Contratto di collaborazione per installazione di rivelatori di particelle nell'esperimento CMS (Compact Muon Solenoid) presso il Large Hadron Collider (LHC).
20/11/2008	20/12/2008	Scuola di Ingegneria Aerospaziale, Sapienza Università di Roma	Contratto di collaborazione per la realizzazione di disegni costruttivi alla richiesta di offerta per la realizzazione di un prototipo del braccio e cerniera facente parte del sistema di separazione di LARES
29/07/2008	28/10/2008	Dip.Ing. Aerospaziale e Astronautica - Sapienza Università di Roma	Contratto di collaborazione per la modellizzazione 3D di componenti meccanici.
14/03/2008	13/07/2008	Dip.Ing. Aerospaziale e Astronautica - Sapienza Università di Roma	Contratto di collaborazione per la predisposizione di test di vibrazione e termovuoto con sensori FBG su componenti di satelliti.
01/01/2008	14/02/2008	Dip.Ing. Aerospaziale e Astronautica - Sapienza Università di Roma	Contratto di collaborazione per lo studio dei processi di estrazione di materie prime dal suolo lunare mediante sistemi robotici.
04/2007	07/2007	Dip.Ing. Aerospaziale e Astronautica - Sapienza Università di Roma	Contratto di collaborazione per sviluppo di sistemi di misura con sensori in fibra ottica.

Part IV - International Experiences

Year(s)	Institution	Activity
2015	Joint Center for Earth Systems Technology, (JCET/UMBC), University of Maryland, BC & NASA Goddard (USA)	Training on the GEODYN orbit determination and parameter estimation software. GEODYN is used for orbit determination of LARES satellite and for tests of fundamental physics with orbital data of geodetic satellites.
2013	GFZ German Research Centre for Geosciences, Wessling (Germany)	Collaboration at the study of "Space Tests of General Relativity using the GALILEO Constellation (REGAL)", a proposal selected by ESA under the "36 GNSS-science announcement of opportunity".
2012	Centre Spatial Guyanais (CSG), Kourou, French Guiana.	Support to the integration of LARES satellite on the Vega launcher. Responsible for monitoring the preload of the separation system using strain gages.
2010	Intespace, Toulouse (France)	Support to the qualification tests of LARES satellite separation system and adapter.

		Responsible for monitoring the preload of the separation system using strain gages.
2010	Hall Spars, Breskens (NL)	Installation of fibre optic FBG sensors structural health monitoring system. The optical fibres were embedded into a carbon fibres composite mast for a Baltic B65 yacht, manufactured in the Hall Spars factory. The system was tested in Valencia (Spain) to demonstrate real time structural health monitoring and shape reconstruction of the mast during sailing.
2007-2009	CERN, Geneva, Switzerland	Collaboration to the installation of muon detectors in the CMS – Compact Muon Solenoid experiment, inside the Large Hadron Collider – LHC. The CMS is one of the two experiments in the LHC that detected the Higgs boson in 2012.

Part V – Teaching experience

Year	Institution	Lecture/Course
2021	Sapienza Università di Roma, Scuola di Ingegneria Aerospaziale	Contract professor for "Numerical modelling of Space Structures" (in English) ING-IND/04
2020	Sapienza Università di Roma, Scuola di Ingegneria Aerospaziale	Contract professor for "Numerical modelling of Space Structures" (in English) ING-IND/04
2019	Sapienza Università di Roma, Scuola di Ingegneria Aerospaziale	Contract professor for "Numerical modelling of Space Structures" (in English) ING-IND/04
2018	Sapienza Università di Roma, Scuola di Ingegneria Aerospaziale	Contract professor for "Numerical modelling of Space Structures" (in English) ING-IND/04
2017	Sapienza Università di Roma, Scuola di Ingegneria Aerospaziale	Contract professor for "Numerical modelling of Space Structures" (in English) ING-IND/04
From 2016	Sapienza Università di Roma, Scuola di Ingegneria Aerospaziale	Teaching support for the course "Space Technology" (in English), in particular for experimental activities about structural health monitoring and holographic interferometry. ING-IND/04
From 2015	Sapienza Università di Roma, Facoltà di Ingegneria	Teaching support for the course "Laboratorio sperimentale di strutture", in particular for experimental activities about structural health monitoring with FBG sensors and resistive strain gages. ING-IND/04
2010 - 2015	Sapienza Università di Roma, Facoltà di Ingegneria	Teaching support for the course of "Tecnologie Astronautiche". ING-IND/04
2007 - 2009	Sapienza Università di Roma, Facoltà di Ingegneria	Teaching support for the course of "Tecnologie dei Materiali Spaziali". ING-IND/04

Part VI - Society memberberships, Awards and Honors

Year	Title
2019-2021	Socio AIDAA - Associazione Italiana di Aeronautica e Astronautica
13/02/2013	Team Award dell'Agenzia Spaziale Italiana (ASI). Motivazione: "per il rilevante contributo al successo del programma LARES".
Dal 2010	Iscritto all'ordine professionale degli Ingegneri della Provincia di Roma.

Part VII – Research Activities

Keywords	Brief Description
LARES – LARES 2 Fundamental physics Experiments of physics in space Orbit determination	Since 2009, I am member of the international scientific team of the LARES (LAser RElativity Satellite) and LARES 2 missions. Some international members of the teams are Prof. Erricos C. Pavlis (NASA), Prof. Rolf Koenig (GFZ), Sir Roger Penrose (Mathematical Institute, University of Oxford and Nobel laureate in physics 2020), Prof. Richard Matzner (University of Texas at Austin), Prof. John C. Ries (Center for Space Research, University of Texas at Austin) , Prof. Vahe Gurzadyan (Center for Cosmology and Astrophysics, Alikhanian National Laboratory and Yerevan State University), The goal of the LARES and LARES 2 missions is the achievement of a series of experimental tests of General Relativity, in particular the measurement of the frame-dragging effect with an unprecedented accuracy, approaching one part per thousand, and a test of the equivalence principle and other phenomena[1-5]. Such a precise measurement of frame-dragging will put limits on the validity of gravity theories alternative to General Relativity, such as the Chern-Simons gravity theory. The frame-dragging effect is particularly important in astrophysics to describe phenomena around objects like rotating supermassive black holes, and in the complex simulations used to describe how gravitational waves are generated during the collision of rotating black holes, that merge into a new rotating black hole (like the gravitational wave event observed by LIGO in 2015), and during the collision of rotating neutron stars [6]. However, in the Solar System the frame-dragging effect is very weak and a direct measure is particularly difficult to be achieved. The LARES mission measures the frame-dragging created by the rotation of the Earth, using methods developed by the LARES team to extract the signal of the relativistic effect from the perturbations due to non-relativistic effects. LARES (launched in 2012) and LARES 2 (to be launched in 2022)[7] have been designed by our team to minimize the effects of the non-gravitational perturbations on their orbits and to maximize the Satellite Laser Ranging (SLR) performances. The laser ranging to LARES and LARES 2 is provided by the International Laser Ranging Service (ILRS). The orbital data are analysed at ISTARC, the Analysis Centre in the School of Aerospace Engineering of Sapienza University of Rome (ISTARC is the only Italian centre credited by NASA to provide orbital predictions of LARES, LARES 2 and other geodetic satellites), both to provide orbital predictions for SLR and to perform tests of fundamental physics. In 2019 the scientific team of LARES, by averaging the data analysis over a period of about seven years to eliminate the errors due in particular to tidal effects with a period of few years and other periodical perturbations, published a measurement with an accuracy of few parts per hundreds, which is at the moment the most precise measurement ever done,

improving the previous results that were at the level of 10%. To obtain the relativistic measurement, the orbital data of LARES are analysed together with the data from the LAGEOS (NASA) and LAGEOS 2 (ASI-NASA) satellites, and using the models of the gravitational field of the Earth obtained from the GRACE and GRACE – Follow On missions (DLR-NASA)[8]. LARES 2 will be launched on an orbit supplementary to the orbit of the LAGEOS satellite: the particular combination of the orbits will drastically improve the precision of the measurement of the frame-dragging effect, by directly cancelling some of the greatest non-relativistic gravitational perturbations.

1. I. Ciufolini, A. Paolozzi, E.C. Pavlis, R. Matzner, R. König, J. Ries, G. Sindoni, C. Paris, V. Gurzadyan, Tests of General Relativity with the LARES Satellites. In: Puetzfeld D., Lämmerzahl C. (eds) Relativistic Geodesy. Fundamental Theories of Physics, vol 196. Springer, Cham (2019).
2. I. Ciufolini, A. Paolozzi, E.C. Pavlis, G. Sindoni, J. Ries, R. Matzner, R. Koenig, C. Paris, V. Gurzadyan and R. Penrose. An improved test of the general relativistic effect of frame-dragging using the LARES and LAGEOS satellites. The European Physical Journal C, 79, 872 (2019). DOI: 10.1140/epjc/s10052-019-7386-z
3. I. Ciufolini, A. Paolozzi, E.C. Pavlis, G. Sindoni, J. Ries, R. Matzner, R. Koenig, C. Paris, V. Gurzadyan and R. Penrose. An improved test of the general relativistic effect of frame-dragging using the LARES and LAGEOS satellites. The European Physical Journal C, 79, 872 (2019). DOI: 10.1140/epjc/s10052-019-7386-z
4. I. Ciufolini, A. Paolozzi, E. C. Pavlis, G. Sindoni, R. Koenig, J. C. Ries, R. Matzner, V. Gurzadyan, R. Penrose, D. Rubincam, C. Paris, A new laser-ranged satellite for General Relativity and space geodesy: I. An introduction to the LARES2 space experiment. The European Physical Journal Plus 132, 336 (2017). DOI: 10.1140/epjp/i2017-11635-1
5. I. Ciufolini, E.C. Pavlis, G. Sindoni, J. Ries, A. Paolozzi, R. Matzner, R. Koenig and C. Paris. A new laser-ranged satellite for General Relativity and space geodesy: II. Monte Carlo simulations and covariance analyses of the LARES 2 experiment. The European Physical Journal Plus 132, 337 (2017). https://doi.org/10.1140/epjp/i2017-11636-0
6. I. Ciufolini, C. Paris, Status of the LARES and LARES 2 Space Experiments. The European Physical Journal P (2021) – in press.
7. I. Ciufolini, A. Paolozzi, E.C. Pavlis, C. Paris, G. Sindoni, LARES 2 an approved mission for testing general relativity. Proceedings of the International Astronautical Congress, IACVolume 2019-October2019 Article number IAC-19_A2_1_4_x5330070th International Astronautical Congress, IAC 2019, Washington, 21 October 2019 - 25 October 2019, 156883
8. I. Ciufolini, A. Paolozzi, E. C. Pavlis, R. Koenig, J. Ries, V. Gurzadyan, R. Matzner, R. Penrose, G. Sindoni, C. Paris, H. Khachatryan, S. Mirzoyan. A test of general relativity using the LARES and LAGEOS satellites and a GRACE Earth gravity model, Measurement of Earth's dragging of inertial frames, The European Physical Journal C, March 2016, 76:120. DOI: 10.1140/epjc/s10052-016-3961-8

LARES - LARES 2
Spacecraft design
Materials selection
Vibration testing
Mechanical testing
Qualification

Since 2009, I worked on the design, qualification, ground testing and support to the integration of LARES satellite and its separation system (specifically designed for the spacecraft), and on the design, selection of materials and testing of components in the thermovacuum chamber. LARES and LARES 2 satellites have been designed to minimize the effects of non-gravitational perturbations on their orbits and to maximize the optical performances with respect to laser pulses sent from the ground stations. LARES is a spherical, passive satellite, manufactured from a single piece of high density tungsten alloy, whose position is measured with extreme precision by means of Satellite Laser Ranging (which is similar to Lunar Laser Ranging) [1,2]. The high density reduces the cross section of the satellite and, because of this, the effects of perturbations such as those produced by the particle drag and of the solar radiation pressure. The

monolithic structure avoids interruptions in the thermal conduction inside the body of the satellite, and because of this it helps to obtain a homogeneous temperature on the spacecraft, in order to reduce the thermal effects on orbital perturbations. All the metal components of the satellite, i.e. structure, screws and retaining rings of the reflectors, are made of the same material to avoid unknown differential charging between different metals [3]. The choice of the material introduced several technological challenges for the manufacturing of the satellite[4]. The laser reflector of LARES are corner cube reflectors (CCR) made of fused silica. The CCRs have been custom made for the mission, to correct the so called velocity aberration by modifying the geometry of the dihedral angles of the cube corners. I participated in the setup of the optical and thermovacuum laboratory, specifically prepared for the needing of the mission, and in the optical testing of the CCRs. I worked at the design and testing of the satellite separation system. The separation system has been designed for the mission, to avoid protruding parts on the spherical satellite. The kinematic and the compatibility of the materials at the interfaces between satellite and separation system have been extensively studied during design, manufacturing and qualification[4,5]. I was responsible of monitoring the pre-load force on the mechanism with strain gages during ground operation and during the integration on the launch vehicle[6-8]. LARES 2 is a satellite designed to be launched on an higher orbit with respect to LARES, with an orbital inclination supplementary to the orbit of LAGEOS 1 satellite[9,10]. The new satellite is not simply a copy of LARES, because the design has been optimized for the different orbit. LARES 2 employs an homogeneous distribution of 303 Cube Corner Reflectors (CCRs) that are COTS (Commercial Off-The-Shelf) items and with a diameter of only 1 inch (25.4 mm), and will be the first satellite of its kind to adopt this solution. The distribution of the CCRs was inspired to the solution of a spherical code problem (similar to Thomson problem) that given N points, minimize the distance of any pair of point on the surface of a sphere. The combination of smaller reflector and their distribution will reduce the "signature effect" a source of error in the laser ranging. The improvement in the measure of satellite position will allow to use LARES 2 as an high quality target for space geodesy. The smaller CCRs are not custom made but are commercial units, therefore a new mounting system has been designed and tested [11] Because of the different geometry and the constraints at launch, different metal alloys have been evaluated for LARES 2 [12-14]. In addition to the tests of General Relativity and fundamental physics, like tests of the equivalence principle, that is at the basis of General Relativity and other viable theories, the orbital data of LARES 2 will be used for research of space geodesy, geophysics and Earth science.

1. I. Ciufolini, A. Paolozzi, C. Paris. Overview of the LARES Mission: orbit, error analysis and technological aspects. JOURNAL OF PHYSICS. CONFERENCE SERIES, vol. 354, p. 1-9, ISSN: 1742-6596
2. A. Paolozzi, I. Ciufolini, C. Paris, G. Sindoni. LARES, a new satellite specifically designed for testing general relativity. International Journal of Aerospace Engineering. Volume 2015 (2015), Article ID 341384, 9 pages.
3. A. Paolozzi, I. Ciufolini, A. Gabrielli, C. Paris, G. Sindoni. LARES mission: engineering aspects. Aerotecnica, Missili e Spazio, vol. 94, p. 23-30, 2015. ISSN: 0365-7442
4. A. Paolozzi, C. Paris, G. Sindoni, M. Ramiconi, C. Vendittozzi. LARES hold-down release system: qualification test campaign. Mechanism Final Presentation Days and Tribology Forum 2010, ESA/ESTEC, Noordwijk, The Netherlands, 4-5 February 2010

5. C. Paris, G. Sindoni, A.Paolozzi, I. Ciufolini. Preliminary Design Analysis of a Separation System for a Laser Ranged Satellite. Mechanism Final Presentation Days and Tribology Forum 2009, ESA/ESTEC, Noordwijk, The Netherlands, 12-13 February 2009.
6. C. Paris, Vibration tests on the preloaded LARES satellite and separation system. Aerospace Science and Technology (2015), pp. 470-476. Reference: AESCTE3241
7. A. Paolozzi, I. Ciufolini, C. Paris. Contribution of strain measurements to the LARES satellite mission. In: International Conference on Structural Engineering Dynamics - ICEDyn 2011. Tavira, Portugal, 20-22 June 2011
8. A. Paolozzi, C. Paris, G. Sindoni, M. Ramiconi, C. Vendittozzi. LARES hold-down release system: qualification test campaign. Mechanism Final Presentation Days and Tribology Forum 2010, ESA/ESTEC, Noordwijk, The Netherlands, 4-5 February 2010
9. I. Ciufolini, C. Paris, Status of the LARES and LARES 2 Space Experiments. The European Physical Journal P (2021). In press.
10. A. Paolozzi, I. Ciufolini, G. Sindoni, C. Paris, The LARES 2 satellite: new challenges for design and ground test, Aerotecnica Missili & Spazio 97 (3), 135-144, 2018.
11. G. Sindoni, C. Paris, I. Ciufolini, Vibration tests of a cube corner reflector assembly of LARES2 satellite. AIDAA Italian Association of Aeronautics and Astronautics, XXV International Congress, 9-12 September 2019, Rome, Italy.
12. A. Paolozzi, G. Sindoni, F. Felli, D. Pilone, A. Brotzu, I. Ciufolini, E.C. Pavlis, C. Paris, Studies on the materials of LARES 2 satellite, Journal of Geodesy 93 (11), 2437-2446, 2019.
13. D. Pilone, A. Brotzu, F. Felli, I. Ciufolini, B. Negri, C. Paris, Haynes 242 Alloy for Lares 2 Satellite. Frattura ed Integrità Strutturale, 15(56), pp. 56-64 (2021).
14. A. Brotzu, F. Felli, D. Pilone, A. Paolozzi, C. Paris, F. Iacoviello, C. Bellini, V. Di Cocco, Study of the fracture behavior of a CuCrZr alloy, Material Design & Processing Communications, 2020; 2:e113.

Thermovacuum Testing

From 2009, I have been responsible for the testing in the thermovacuum and optical testing laboratory, LARES-lab. The laboratory was designed and prepared for testing and qualifying the optical payload of the LARES satellite. In particular, the thermovacuum chamber is equipped with a liquid nitrogen cooled shroud, a fused silica window for a AM0 solar spectrum lamp, and an optical window for optical testing in vacuum. An optical table near the windows hosts the optical setup. PT100 platinum resistance thermometers are used to measure the temperatures on the objects under tests [1-3]. Recently, I was involved in the design and testing of the upgrade of the chamber consisting in doubling the high vacuum-pumping power, the challenging with very high speed ramps and the possibility to perform very long duration automatic thermal cycling with a special designed remote controls on all the components of the system. The laboratory was used to test optics of LARES and LARES 2 satellites, and of other spacecraft (CHAMP) . Thermovacuum tests have been performed on other small satellites (STECCOsat Unisat-5, Tigri-sat), satellite subsystems (such as ion thrusters, on board computers, power system, small scientific payloads, etc…) and materials[4-9]. The new upgrade is being used for testing advanced CFRP composite materials and metallic sandwich structures for space structures. Other didactic and research activities included testing optical fibre FBG sensors in simulated space environment [10,11].

1. Paolozzi, I. Ciufolini, C. Paris, G. Sindoni. A remotely controllable thermo-vacuum facility for testing small payloads. In: Computer Supported Education, pp. 581-597. Communications in Computer and Information Science 583, Eds. Susan Zvacek, Maria Teresa Restivo, James Uhomoibhi, Markus Helfert.
2. Paris, G. Sindoni. A remote controllable thermovacuum facility for CubeSats and small payloads. Proceedings of 3rd IAA conference on university satellite missions and cubesat workshop, November 30 – December 5, 2015, Rome. IAA-CU-15-01-43

3. Claudio Paris and Giampiero Sindoni. LARES-LAB: a facility for environmental testing of satellite components and micro satellites. 2nd IAA conference on dynamics and control of space systems, March 24-26, 2014, Roma, Italy. Paper: IAA-AAS-DyCoSS2-14-06-01
4. P. Teofilatto, A. Obeid, C. Paris, A. Paolozzi. Earth observation with TIGRIsat: structural and mission design. 66th International Astronautical Congress - IAC 2015, 12-16 October 2015, Jerusalem (Israel).
5. R. Di Roberto, C. Paris, A. Nascetti, A. Paolozzi, F. Graziani. Assessment of a low-cost multilayer insulation system for thermal control of nanosatellites. 66th International Astronautical Congress - IAC 2015, 12-16 October 2015, Jerusalem (Israel).
6. K. Fayaz Hussain, K. Faisal Hussain, C. Paris, M. Parisse, I. Ciufolini, Absorptivity measurement on Satellite Materials from the Transient Heating Phase of a Thermovacuum test. In: 68th International Astronautical Congress, IAC 2019, Washington, DC (USA), 21-25 October 2019.
7. S. Laurenzi, L. F. Martucci, F. Zaccardi, C. Paris, E. Toto, M. Santonicola, Fabrication and characterization of layered UHMWPE coatings on aerospace-grade epoxy resin for space radiation shielding. (2020) Proceedings of the 71st International astronautical congress, IAC 2020, the CyberSpace Edition, 12-14 October 2020.
8. M. G. Santonicola, E. Toto, C. Paris, S. Laurenzi, G. Marino, A. Lohvynenko, K. Cho, Experimental study of solar radiation effects on carbon nanocomposite sensors in simulated space environment. In: 69th International Astronautical Congress IAC 2018, Bremen (Germany) 1-5 October 2018.
9. S. Laurenzi, G. De Zanet, D. Rufo, M. G. Santonicola, C. Paris, G. Marino, A. Lohvynenko, K. Cho, Polyethylene-based nanocomposites for radiation shielding: modelling in radiative environment and laboratory tests in thermo-vacuum chamber. In: 69th International Astronautical Congress IAC 2018, Bremen (Germany) 1-5 October 2018.
10. Paris, G. Sindoni, A. Paolozzi, I. Ciufolini, F. Felli, The LARES-Lab thermovacuum facility with FBG sensor monitoring capability, AIDAA Italian Association of Aeronautics and Astronautics, XXIV International Conference, 18-22 September 2017, Palermo – Enna, Italy.
11. 59. C. Paris, G. Sindoni, A. Paolozzi, A. Gabrielli, I. Ciufolini. Temperature monitoring of thermal-vacuum tests with optical fibre sensors. preliminary results. 66th International Astronautical Congress - IAC 2015, 12-16 October 2015, Jerusalem (Israel).

Structural health monitoring
FBG sensors

From 2007, I worked on structural health monitoring with both resistive strain gages and optical fibre FBG sensors. Resistive strain gages were installed on the separation system of LARES satellite to monitor the pre-load during ground operations (qualification tests, transport) and during integration on the launcher [1]. I worked with resistive strain gages for didactic activities and for testing on the structures and materials of the microsatellites developed at the School of Aerospace Engineering. Fibre optic FBG sensors are sensors made of optical fibres. Their main advantages are their immunity to electromagnetic interferences, resistance to corrosion, small dimensions, the possibility to embed the fibres inside composite materials, and the possibility of having multiple sensors on a single optical fibre. Moreover, using light signals, these sensors are immune to the risk of electric discharge and sparks, therefore are suitable for environment with high risk of fire. I worked on the development and the installation of monitoring system based on FBG sensors on aerospace structures[2,3], civil engineering structures (railways, pipelines)[4-7], and racing yachts[8]. I tested FBG sensors for strain monitoring during the vibration tests of the GALILEO Giove-B spacecraft[9]. During the qualification tests of the LARES satellite, I worked on the use of FBG sensors for indirect measurement of the loads at the interface between satellite and separation system, to assess the compatibility of the materials with Hertz pressure[10,11]. I have also tested sapphire optical fibers embedded into metal alloys for high temperature structural health monitoring[12].

1. A. Paolozzi, I. Ciufolini, C. Paris. Contribution of strain measurements to the LARES satellite mission. In: International Conference on Structural Engineering Dynamics - ICEDyn 2011. Tavira, Portugal, 20-22 June 2011
2. C. Paris, C. Vendittozzi, A. Basaglia. Experimentation of fiber optic FBG sensors in a CFRP aerospace component. Proceedings of XXII AIDAA Conference, Neaples (Italy), September 9th - 12th, 2013.
3. C. Paris, G. Sindoni, C. Vendittozzi, C. Cappelletti, F. Graziani, FBG optical sensors for environmental tests of microsatellites, IAC-16-C2.2.12, 67th International Astronautical Congress (IAC), Guadalajara, Mexico, 26 -30 September 2016
4. C. Lupi, F. Felli, E. Ciro, C. Paris, C. Vendittozzi, Railway overhead contact wire monitoring system by means of FBG sensors. Frattura e Integrita Strutturale, 15 (57), p246-258 (2021)
5. A.Paolozzi, C. Paris, C. Vendittozzi, F. Felli, M. Mongelli, A. Colucci, H. Asanuma, Test of FBG sensors for monitoring high pressure pipes, Proc. SPIE 10168, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2017
6. F. Felli, A. Paolozzi, C. Vendittozzi, C. Paris, H. Asanuma. Use of FBG sensors for health monitoring of pipelines. Proc. SPIE 9803, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2016, 98031L (20 April 2016).
7. F. Felli, A. Paolozzi, C. Vendittozzi, C. Paris, H. Asanuma,G. De Canio, M. Mongelli, A. Colucci. Structural health monitoring of pipelines for environment pollution mitigation. ASME 2015 Conference on Smart Materials, Adaptive Structures and Intelligent Systems SMASIS2015, September 21-23, 2015, Colorado Springs, Colorado.
8. C. Vendittozzi, G. Sindoni, C. Paris, P. Persi del Marmo. Application of an FBG sensors system for structural health monitoring and high performance trimming on racing yacht. Proceedings of the Fifth International Conference on Sensing Technology (ICST), 2011, 617-622.
9. A. Bramante, M. Caponero, G. Coppotelli, M. Cotogni, A. Paolozzi, C. Paris, I. Peroni. New technology for aerospace sensors. Satellite dynamic and thermal measurements using fiber optic FBG sensors. Proceedings of the 6th International Symposium on Environmental Testing for Space Programmes, ESA/ESTEC, Noordwijk, The Netherlands, 12 - 14 June 2007.
10. A. Paolozzi, I. Ciufolini, I. Peroni, F. M. Onorati, L. Acquaroli, L. Scolamiero, G. Sindoni, C. Paris, C. Vendittozzi, M. Ramiconi, N. Preli, A. Lucantoni, F. Passeggio, S. Berardis. Fibre Optic Sensors for the Validation of the Numerical Simulation on the Breadboard of the Lares Separation System. 59th International Astronautical Congress IAC 2008, Glasgow, Scotland, 29 September - 3 October 2008
11. A. Paolozzi, I. Ciufolini, C. Paris, L. Acquaroli, P. Piersigilli and A. Gabrielli, Tests on LARES separation system components using fiber optic sensors. Atti del XX Congresso Nazionale AIDAA, 3 Jul, 2009.
12. C. Paris, C. Vendittozzi, A. Paolozzi, F. Felli, Tests of Sapphire Optical Fiber Sensors for Strain Monitoring in High Temperature Environment, Aerotecnica Missili & Spazio, vol. 95, n. 3, pp. 136-144 (2016)

Optics	From 2009, I worked in the LARES-lab on testing the retroreflectors of LARES, LARES 2 and other mission [1-4]. The testing consists in recording the Far Field Diffraction Patterns (FFDP) of the reflectors with a setup designed and prepared for the task. The FFDP are recorded under different condition, and then analysed and compared to the theorical pattern to assess the efficiency of the reflector. The efficiency of the retroreflector array of LARES have been demonstrated on orbit by the comparison with other laser ranged missions[5,6]. I have used the optical setup of the LARES-lab also for assisting the didactic activities of the course of Space Technology, for teaching diffraction optics, interferometry, and holography. I have worked as co-tutor on degree thesis on holographic interferometry for measuring small deformation on mechanical components[7].

1. A. Paolozzi, I. Ciufolini, C. Paris, G. Sindoni, D. Spano. Qualification tests on the optical retro-reflectors of LARES satellite. In: 63rd International Astronautical Congress IAC 2012. Naples, Italy, 1-5 October, 2012
2. A. Paolozzi, I. Ciufolini, L. Schirone, I. Peroni, C. Paris, D. Spano, G. Sindoni, C. Vendittozzi, G. Battaglia, M. Ramiconi. Tests of LARES cube corner reflectors in simulated space environment (preliminary results). Proceedings of the 61st International Astronautical Congress 2010 (IAC 2010), Prague, CZ.
3. C. Paris, R. Neubert. Tests of LARES and CHAMP cube corner reflectors in simulated space environment. IEEE Aerospace Conference, Big Sky, Montana, Mar. 7-14, 2015.
4. C. Paris, S. Carletta, STECCOsat, a laser ranged nanosatellite. Advances in the Astronautical SciencesVolume 173, Pages 235 - 2442020 Article number AAS 20-2225th IAA Conference on University Satellite Missions and Cubesat Workshop, 2020, Rome, 28 January 2020 - 31 January 2020, 261629
5. C. Paris, G. Sindoni, Comparison of Optical Quality of Some Passive Laser Ranged Satellites. Proceedings of PhotonIcs & Electromagnetics Research Symposium - PIERS 2019 in Rome, Italy, 17-20 June, 2019.
6. C. Pavlis, I. Ciufolini, A. Paolozzi, C. Paris, G. Sindoni. Quality assessment of LARES satellite ranging data. Proceedings of Metrology for Aerospace (MetroAeroSpace), 2nd IEEE International Workshop on Metrology for Aerospace, Benevento, Italy, June 4-5, 2015
7. A. Paolozzi, C. Paris, G. Sindoni, S. Vempati, I. Ciufolini, Holographic interferometry for measuring displacements of LARES 2 satellite components. AIDAA Italian Association of Aeronautics and Astronautics, XXV International Congress, 9-12 September 2019, Rome, Italy.

High energy physics Particle detectors	From 2007 to 2009 I participate in the Compact Muon Solenoid (CMS) experiment at the Large Hadron Collider, CERN, that detected the Higgs boson [1]. I was active in the team for the design, assembly, testing and integration of the Resistive Plate Chambers (RPC) muon detectors inside CMS[2].

1. The CMS Collaboration, … , C. Paris et al. The CMS experiment at the CERN LHC. Journal of Instrumentation, 2008 JINST 3 S08004 97.
2. A. Colaleo, ... , C. Paris, et al. The compact muon solenoid RPC barrel detector. Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment. Volume 602, Issue 3, 1 May 2009, Pages 674-678.

Part VIII – Organization of conferences

2019	Local organizing committee of the "First LARES 2 and fourth LARES International Science Workshop", Rome, Italy, 01-05 July 2019
2015	Local organizing committee of the "3rd LARES International Science Workshop 2015", Rome, Italy, 15-17 Giugno 2015
2012	Local organizing committee of the "2nd LARES International Science Workshop", Rome, Italy, 17-18 September 2012
2011	Organizing committee of the workshop "Sensori FBG in fibra ottica: nuove tecnologie per il monitoraggio strutturale", Ordine degli Ingegneri della Provincia di Roma, Roma, 13 July 2011.
2009	Local organizing committee of the "LARES International Science Workshop", Rome, Italy, 3-4 July 2009

Part IX – Participation in Research Programs

Year	Title	Program
2017-to date	Investigator	Accordo 2017-23-H.0 tra ASI e Scuola di Ingegneria Aerospaziale, Sapienza Università di Roma, "Missione LARES 2 - Supporto Scientifico"
2020-to date	Investigator	Accordo 2020-7-HH.0 tra ASI e Scuola di Ingegneria Aerospaziale, Sapienza Università di Roma, "LARES 1 – Attività di analisi dei dati scientifici della missione"
2015-2019	Investigator	Accordo 2015-021-R.O tra ASI e Scuola di Ingegneria Aerospaziale, Sapienza Università di Roma, "LARES – Misura dell'effetto relativistico Lense-Thirring"
2012-2014	Investigator	Contratto I/034/12/0 tra ASI e Dipartimento DIAEE, Sapienza Università di Roma, "LARES Scientific data exploitation", e relativo addendum.
2011	Investigator	Contratto tra Alenia Aermacchi Spa e Centro Ricerche Progetto San Marco (CRPSM), Sapienza Università di Roma "Experimentation of application of optical fibers in aircraft structures or structural components"
2011-2013	Investigator	Contratto 4000103504/2011/NL/WE tra Centro Ricerche Progetto San Marco (CRPSM), Sapienza Università di Roma ed European Space Agency ESTEC, "Space Tests of General RElativity Using GAlileo Constellation (REGAL)
2008-2012	Investigator	Contratto I/043/08/0 tra ASI e Scuola di Ingegneria Aerospaziale, Sapienza Università di Roma, "LARES supporto scientifico".
2008-2012	Investigator	Contratto tra Carlo Gavazzi Space e Dipartimento di Ingegneria Aerospaziale e Astronautica di Sapienza relativo alla progettazione del satellite LARES e di tutti i sistemi di movimentazione e di test di bilanciamento dal titolo "Sviluppo del Satellite LARES - Fase B2-C/D-E1"
2008-2012	Investigator	Contratto tra Rheinmetall e Dipartimento di Ingegneria Aerospaziale e Astronautica, Sapienza Università di Roma relativo alla progettazione del sistema di separazione e relativi prototipi di componenti del sistema di separazione dal titolo "Attivita di design meccanismo LARES".

Part X – Activity as Reviewer

Acting as reviewer for the following international peer-reviewed journals:

- Journal of Sensors, Hindawi publisher.
- Optics & Laser Tecnology
- Acta Astronautica
- Journal of Intelligent Material System and Stryctures (JIMSS)
- Case Studies in Thermal Engineering

Part XI - Patents

Year	Title
2017	"Nuovo satellite sferico con riflettori per fisica fondamentale e scienze della Terra". Numero brevetto: 102017000074174. Inventori: A. Paolozzi, C. Paris, G. Sindoni, I. Ciufolini. Data di deposito 03/07/2017. Data di concessione 30/09/2019.
2008	“Progetto innovativo di un satellite inseguito via laser". Numero brevetto: 1388729/2008. Inventori: I. Ciufolini, A. Paolozzi, G. Sindoni, C. Paris. Data di concessione 30/04/2011

Part XII – Summary of Scientific Achievements

Product type	Number	Data Base	Start	End
Papers [international]	81	**Scopus**	2007	2021

Total Impact factor	45.75
Total Citations	5600
Average Citations per Product	69.13
Hirsch (H) index	14
Normalized H index*	1

Product type	Number	Data Base	Start	End
Papers [international]	45	**WOS**	2008	2021

Total Impact factor	45.75
Total Citations	3459
Average Citations per Product	78.86
Hirsch (H) index	9
Normalized H index*	0.69

*H index divided by the academic seniority.

Part XIII– Indicatori relativi alla produzione scientifica in relazione alle soglie ASN 2021-2023 del SC 09/A1 - INGEGNERIA AERONAUTICA, AEROSPAZIALE E NAVALE

La simulazione prodotta da IRIS - CINECA il giorno 29/09/2020 ha prodotto esito positivo su tutti e tre gli indicatori sia per la posizione di docente di Seconda Fascia che di Prima Fascia.

Part XIV– Selected Publications

Total Impact Factor (of selected publications): 32.825.

Average Impact Factor (of selected publications): 2.735.

WOS - Total Citations (of selected publications): 64.

WOS - Average Citations: (of selected publications): 5.333.

SCOPUS - Total Citations (of selected publications): 118.

SCOPUS - Average Citations: (of selected publications): 9.833.

1. I. Ciufolini, C. Paris, Status of the LARES and LARES 2 Space Experiments. The European Physical Journal Plus (2021). In press.
   Journal Impact Factor: 3.911.

2. D. Pilone, A. Brotzu, F. Felli, I. Ciufolini, B. Negri, C. Paris, Haynes 242 Alloy for Lares 2 Satellite. Frattura ed Integrità Strutturale, 15(56), pp. 56-64 (2021).
   http://doi.org/10.3221/IGF-ESIS.56.04
   Journal Impact Factor: not yet available. Citations WOS: 0. Citations SCOPUS: 0.

3. I. Ciufolini, A. Paolozzi, E.C. Pavlis, G. Sindoni, J. Ries, R. Matzner, R. Koenig, C. Paris, V. Gurzadyan and R. Penrose. An improved test of the general relativistic effect of frame-dragging using the LARES and LAGEOS satellites. The European Physical Journal C, 79, 872 (2019). http://doi.org/10.1140/epjc/s10052-019-7386-z
   Journal Impact Factor: 4.59. Citations WOS: 9. Citations SCOPUS: 9.

4. A. Paolozzi, G. Sindoni, F. Felli, D. Pilone, A. Brotzu, I. Ciufolini, E.C. Pavlis, C. Paris, Studies on the materials of LARES 2 satellite, Journal of Geodesy 93 (11), pp. 2437-2446, 2019. http://doi.org/10.1007/s00190-019-01316-z
   Journal Impact Factor: 4.26. Citations WOS: 4. Citations SCOPUS: 7.

5. I. Ciufolini, R.A. Matzner,J. Feng, D.P. Rubincam, E.C. Pavlis, J.C. Ries, G. Sindoni, A. Paolozzi, C. Paris. A new laser-ranged satellite for General Relativity and Space Geodesy IV. Thermal drag and the LARES 2 space experiment. The European Physical Journal Plus 133 (8), 333, 2018. http://doi.org/10.1140/epjp/i2018-12174-y
   Journal Impact Factor: 3.911. Citations WOS: 1. Citations SCOPUS: 3.

6. I. Ciufolini, A. Paolozzi, E. C. Pavlis, G. Sindoni, R. Koenig, J. C. Ries, R. Matzner, V. Gurzadyan, R. Penrose, D. Rubincam, C. Paris, A new laser-ranged satellite for General Relativity and space geodesy: I. An introduction to the LARES 2 space experiment. The European Physical Journal Plus 132, 336 (2017).
   http://doi.org/10.1140/epjp/i2017-11635-1
   Journal Impact Factor: 3.911. Citations WOS: 13. Citations SCOPUS: 23.

7. C. Paris and G. Sindoni. Upgrade of the LARES-lab Remote Controllable Thermo-vacuum Facility - Lab Improvements for Remote Testing and e-Learning. In Proceedings of the 8th International Conference on Computer Supported Education (CSEDU 2016) - Volume 2, pages 347-352, 21-23 April 2016, Rome, Italy. ISBN: 978-989-758-179-3
   Citations WOS: 0. Citations SCOPUS: 1.
   Lavoro presentato a conferenza, privo di IF e inserito per evidenziare l'adesione al al criterio "Specifica esperienza sull'attività di ricerca prevista, come risultante dalle pubblicazioni e dai titoli presentati".

8. C. Paris, R. Neubert. Tests of LARES and CHAMP cube corner reflectors in simulated space environment. IEEE Aerospace Conference, Big Sky, Montana, Mar. 7-14, 2015.
   Citations WOS: 2. Citations SCOPUS: 12.
   Lavoro presentato a conferenza, privo di IF e inserito per evidenziare l'adesione al al criterio "Specifica esperienza sull'attività di ricerca prevista, come risultante dalle pubblicazioni e dai titoli presentati".

9. I. Ciufolini, A. Paolozzi, E. C. Pavlis, R. Koenig, J. Ries, V. Gurzadyan, R. Matzner, R. Penrose, G. Sindoni and C. Paris, Preliminary orbital analysis of the LARES space experiment. The European Physical Journal Plus, July 2015, 130:133, Springer.
   https://doi.org/10.1140/epjp/i2015-15133-2
   Journal Impact Factor: 3.911. Citations WOS: 13. Citations SCOPUS: 19.

10. C. Paris, Vibration tests on the preloaded LARES satellite and separation system. Aerospace Science and Technology (2015), pp. 470-476. AESCTE3241
http://doi.org/10.1016/j.ast.2015.01.023
Journal Impact Factor: 5.107. Citations WOS: 7. Citations SCOPUS: 13.

11. A. Paolozzi, I. Ciufolini, C. Paris, G. Sindoni. LARES, a new satellite specifically designed for testing general relativity. International Journal of Aerospace Engineering. Volume 2015 (2015), Article ID 341384, 9 pages. http://doi.org/10.1155/2015/341384.
Journal Impact Factor: 1.158. Citations WOS: 15. Citations SCOPUS: 31.

12. C. Canoci, I. Ciufolini, A. Coluccia, C. Paris, G. Ricci, G. Salvadori, G. Sindoni. On the statistics of the orbital residuals of the LAGEOS satellites. Modern Physics Letters A, Vol. 30, No. 19 (2015), 14 pages. https://doi.org/10.1142/s0217732315500911
Journal Impact Factor: 2.066. Citations WOS: 0. Citations SCOPUS: 0.

Part XV– Publications from 2007 to 2001 (including the 12 selected)

1. I. Ciufolini, C. Paris, Status of the LARES and LARES 2 Space Experiments. The European Physical Journal P (2021). In press.
2. L. Schirone, M. Ferrara, C. Paris, F. Pellitteri, Power bus management techniques for space missions in Low Earth Orbit. Energies (2021). In press.
3. D. Pilone, A. Brotzu, F. Felli, I. Ciufolini, B. Negri, C. Paris, Haynes 242 Alloy for Lares 2 Satellite. Frattura ed Integrità Strutturale, 15(56), pp. 56-64 (2021). doi: 10.3221/IGF-ESIS.56.04.
4. C. Lupi, F. Felli, E. Ciro, C. Paris, C. Vendittozzi, Railway overhead contact wire monitoring system by means of FBG sensors. Frattura e Integrita Strutturale, 15 (57), p246-258 (2021) DOI https://doi.org/10.3221/IGF-ESIS.57.18
5. A. Brotzu, F. Felli, D. Pilone, A. Paolozzi, C. Paris, F. Iacoviello, C. Bellini, V. Di Cocco, Study of the fracture behavior of a CuCrZr alloy, Material Design & Processing Communications, 2020; 2:e113. DOI: 10.1002/mdp2.113
6. I. Ciufolini, C. Paris, E. C. Pavlis, K. F. Hussain, B. Negri, G. Bianco, S. Pirrotta, A. Spaziani, LARES 2: status of the mission, (2020) Proceedings of the 71st International astronautical congress, IAC 2020, the CyberSpace Edition, 12-14 October 2020.
7. S. Laurenzi, L. F. Martucci, F. Zaccardi, C. Paris, E. Toto, M. Santonicola, Fabrication and characterization of layered UHMWPE coatings on aerospace-grade epoxy resin for space radiation shielding. (2020) Proceedings of the 71st International astronautical congress, IAC 2020, the CyberSpace Edition, 12-14 October 2020.
8. C. Paris, S. Carletta, STECCOsat, a laser ranged nanosatellite. Advances in the Astronautical SciencesVolume 173, Pages 235 - 2442020 Article number AAS 20-2225th IAA Conference on University Satellite Missions and Cubesat Workshop, 2020, Rome, 28 January 2020 - 31 January 2020, 261629
9. A. Meneghin, D. Paglialunga, G. Poggiali, S. Pirrotta, G. Impresario, A. Sabatini, C. Pacelli, A. Nascetti, L. Iannascoli, S. Carletta, L. Schirone, L. Anfossi, M. Mirasoli, L. Popova, A. Donati, A. Bardi, M. Balsamo, J.R. Brucato, Astrobio cubesat: A nanosatellite for astrobiology experiments in space. Advances in the Astronautical SciencesVolume 173, Pages 197 - 2052020 Article number AAS 20-2195th IAA Conference on University Satellite Missions and Cubesat Workshop, 2020, Rome, 28 January 2020 - 31 January 2020, 261629
10. I. Ciufolini, A. Paolozzi, E.C. Pavlis, R. Matzner, R. König, J. Ries, G. Sindoni, C. Paris, V. Gurzadyan, Tests of General Relativity with the LARES Satellites. In: Puetzfeld D., Lämmerzahl C. (eds) Relativistic Geodesy. Fundamental Theories of Physics, vol 196. Springer, Cham (2019). https://doi.org/10.1007/978-3-030-11500-5_15

11. A. Paolozzi, G. Sindoni, F. Felli, D. Pilone, A. Brotzu, I. Ciufolini, E.C. Pavlis, C. Paris, Studies on the materials of LARES 2 satellite, Journal of Geodesy 93 (11), 2437-2446, 2019. DOI: 10.1007/s00190-019-01316-z

12. I. Ciufolini, A. Paolozzi, E.C. Pavlis, R. Matzner, R. König, J. Ries, G. Sindoni, C. Paris, C. and V. Gurzadyan, Tests of General Relativity with the LARES Satellites. In: Relativistic Geodesy. Fundamental Theories of Physics, vol. 196, pp. 467-479, Springer, Cham, 2019. DOI: 10.1007/978-3-030-11500-5_15

13. I. Ciufolini, A. Paolozzi, E.C. Pavlis, G. Sindoni, J. Ries, R. Matzner, R. Koenig, C. Paris, V. Gurzadyan and R. Penrose. An improved test of the general relativistic effect of frame-dragging using the LARES and LAGEOS satellites. The European Physical Journal C, 79, 872 (2019). DOI: 10.1140/epjc/s10052-019-7386-z

14. A. Paolozzi, C. Paris, G. Sindoni, S. Vempati, I. Ciufolini, Holographic interferometry for measuring displacements of LARES 2 satellite components. AIDAA Italian Association of Aeronautics and Astronautics, XXV International Congress, 9-12 September 2019, Rome, Italy.

15. G. Sindoni, C. Paris, I. Ciufolini, Vibration tests of a cube corner reflector assembly of LARES2 satellite. AIDAA Italian Association of Aeronautics and Astronautics, XXV International Congress, 9-12 September 2019, Rome, Italy.

16. C. Paris, G. Sindoni, Comparison of Optical Quality of Some Passive Laser Ranged Satellites. Proceedings of PhotonIcs & Electromagnetics Research Symposium - PIERS 2019 in Rome, Italy, 17-20 June, 2019.

17. I. Ciufolini, A. Paolozzi, E.C. Pavlis, C. Paris, G. Sindoni, LARES 2 an approved mission for testing general relativity. Proceedings of the International Astronautical Congress, IACVolume 2019-October2019 Article number IAC-19_A2_1_4_x5330070th International Astronautical Congress, IAC 2019, Washington, 21 October 2019 - 25 October 2019, 156883

18. K. Fayaz Hussain, K. Faisal Hussain, C. Paris, M. Parisse, I. Ciufolini, Absorptivity measurement on Satellite Materials from the Transient Heating Phase of a Thermovacuum test. Proceedings of the International Astronautical Congress, IAC 2019, Washington, 21 October 2019 - 25 October 2019, Article number IAC-19_C2_1_7_x4912570th

19. A. Paolozzi, I. Ciufolini, G. Sindoni, C. Paris, The LARES 2 satellite: new challenges for design and ground test, Aerotecnica Missili & Spazio 97 (3), 135-144, 2018. DOI: 10.1007/BF03404767

20. F. Felli, C. Paris, A. Paolozzi, C. Vendittozzi, G. De Lellis, I. Asanuma, Monitoring systems for pipeline safety based on FBG sensors. WIT Transactions on The Built Environment, Vol. 174, 405-412, 2018. DOI: 10.2495/SAFE170371

21. I. Ciufolini, R. Matzner, J. Feng, D.P. Rubincam, E.C. Pavlis, J.C. Ries, G. Sindoni, A. Paolozzi, C. Paris. A new laser-ranged satellite for General Relativity and Space Geodesy IV. Thermal drag and the LARES 2 space experiment. The European Physical Journal Plus 133 (8), 333, 2018. DOI: 10.1140/epjp/i2018-12174-y

22. I. Ciufolini, E. C. Pavlis, J. Ries, R. Matzner, R. Koenig, A. Paolozzi, G. Sindoni, V. Gurzadyan, R. Penrose, C. Paris, Reply to "A comment on "A test of general relativity using the LARES and LAGEOS satellites and a GRACE Earth gravity model, by I. Ciufolini et al." ". The European Physical Journal C 78, no. 11 (2018): 880, 2018. DOI: 10.1140/epjc/s10052-018-6303-1

23. A. Paolozzi, F. Felli, D. Pilone, A. Brotzu, I. Ciufolini, Development and analysis of a new alloy candidate for LARES 2 satellite. In: 69th International Astronautical Congress IAC 2018, Bremen (Germany) 1-5 OCT 2018

24. M. G. Santonicola, E. Toto, C. Paris, S. Laurenzi, G. Marino, A. Lohvynenko, K. Cho, Experimental study of solar radiation effects on carbon nanocomposite sensors in simulated space environment. In: 69th International Astronautical Congress IAC 2018, Bremen (Germany) 1-5 OCT 2018

25. S. Laurenzi, G. De Zanet, D. Rufo, M. G. Santonicola, C. Paris, G. Marino, A. Lohvynenko, K. Cho, Polyethylene-based nanocomposites for radiation shielding: modelling in radiative environment and

laboratory tests in thermo-vacuum chamber. In: 69th International Astronautical Congress IAC 2018, Bremen (Germany) 1-5 OCT 2018

26. C. Paris, G. Sindoni, T. Di Sabato, Close Approaches of Debris to LARES Satellite During Its First Four Years of Operation, Transactions on Environment and Electrical Engineering (2017) [S.l.], v. 2, n. 1, p. 90-97, apr. 2017. DOI: 10.22149/teee.v2i1.8

27. A. Paolozzi, C. Paris, C. Vendittozzi, F. Felli, M. Mongelli, A. Colucci, H. Asanuma, Test of FBG sensors for monitoring high pressure pipes, Proc. SPIE 10168, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2017, 101681Q (April 12, 2017); From Conference Volume 10168. DOI:10.1117/12.2260474

28. I. Ciufolini, A. Paolozzi, E. C. Pavlis, G. Sindoni, R. Koenig, J. C. Ries, R. Matzner, V. Gurzadyan, R. Penrose, D. Rubincam, C. Paris, A new laser-ranged satellite for General Relativity and space geodesy: I. An introduction to the LARES2 space experiment. The European Physical Journal Plus 132, 336 (2017). DOI: 10.1140/epjp/i2017-11635-1

29. I. Ciufolini, E.C. Pavlis, G. Sindoni, J. Ries, A. Paolozzi, R. Matzner, R. Koenig and C. Paris. A new laser-ranged satellite for General Relativity and space geodesy: II. Monte Carlo simulations and covariance analyses of the LARES 2 experiment The European Physical Journal Plus 132, 337 (2017). https://doi.org/10.1140/epjp/i2017-11636-0

30. A. Paolozzi, C. Paris, G. Sindoni, D. Arnold, E.C. Pavlis, I. Ciufolini, R. Neubert. (2017, June). Data efficiency for the satellite LARES. In: 2017 IEEE International Conference on Environment and Electrical Engineering and 2017 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe), Milan 6-9 June 2017 DOI: 10.1109/EEEIC.2017.7977819

31. E.C. Pavlis., G. Sindoni, A. Paolozzi, I. Ciufolini, C. Paris, M. Kuzmicz-Cieslak, A. Gabrielli, El Niño effects on earth rotation parameters from LAGEOS and LARES orbital analysis. In: 2017 IEEE International Conference on Environment and Electrical Engineering and 2017 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe), Milan 6-9 June 2017 DOI: 10.1109/EEEIC.2017.7977821

32. V. Gagliarducci, A. Gerardi, C. Paris, Contribution of radar meteor scatter technology to NEO and ozone layer monitoring. In: 2017 IEEE International Conference on Environment and Electrical Engineering and 2017 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe), Milan 6-9 June 2017 DOI: 10.1109/EEEIC.2017.7977736

33. C. Paris, G. Sindoni, A. Paolozzi, I. Ciufolini, F. Felli, The LARES-Lab thermovacuum facility with FBG sensor monitoring capability, AIDAA Italian Association of Aeronautics and Astronautics, XXIV International Conference, 18-22 September 2017, Palermo – Enna, Italy

34. I. Ciufolini, A. Paolozzi, G. Sindoni, C. Paris, Measurement of frame dragging of general relativity through passive satellites, AIDAA Italian Association of Aeronautics and Astronautics, XXIV International Conference, 18-22 September 2017, Palermo – Enna, Italy

35. C. Paris, C. Vendittozzi, A. Paolozzi, F. Felli, Tests of Sapphire Optical Fiber Sensors for Strain Monitoring in High Temperature Environment, Aerotecnica Missili & Spazio, vol. 95, n. 3, pp. 136-144 (2016) https://doi.org/10.1007/BF03404722

36. A. Paolozzi, F. Felli, C. Vendittozzi, C. Paris, H. Asanuma. Analysis of FBG sensors data for pipeline monitoring. Proceedings of the ASME 2016 Conference on Smart Materials, Adaptive Structures and Intelligent Systems SMASIS2016, September 28-30, 2016, Stowe, VT, USA. SMASIS2016-9260

37. I. Ciufolini, A. Paolozzi, E. C. Pavlis, R. Koenig, J. Ries, V. Gurzadyan, R. Matzner, R. Penrose, G. Sindoni, C. Paris, H. Khachatryan, S. Mirzoyan. A test of general relativity using the LARES and LAGEOS satellites and a GRACE Earth gravity model, Measurement of Earth's dragging of inertial frames, The European Physical Journal C, March 2016, 76:120. DOI: 10.1140/epjc/s10052-016-3961-8

38. A. Paolozzi, I. Ciufolini, C. Paris, G. Sindoni. A remotely controllable thermo-vacuum facility for testing small payloads. In: Computer Supported Education, pp. 581-597. Communications in

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