SPACE NEWSLETTER

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UNI@VERSO LO SPAZIO

University Mediterranea of Reggio Calabria

Return to the Veil Nebula. Credit: ESA/Hubble & NASA, Z. Levay

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University Mediterranea of Reggio Calabria

IN THIS ISSUE

To our readers,

Looking at the sky has always helped to take one's eyes off the ground, imagine propitious scenarios, make decisions, and change. Above all, looking at the sky has always helped us ask ourselves great and countless questions. At the same time, it has enabled us to formulate as many great answers as possible.

Seeking new answers is the innate need of the human being. Unfortunately, in the face of uncertainties and conflicts, we sometimes increase such questions or, on the contrary, impoverish them. In the worst case, the absence of questions leads to indifference.

Continuing on this project means a lot for us: it means continuing to stimulate questions able to inspire answers, lead to action or reflection, and not be indifferent. Of course, producing this issue has been complicated and difficult, considering the period we are going through. But, at the same time, it helped us look beyond.

Indeed, research, innovation and culture are made up of questions. They come to life thanks to the spirit of researchers and innovators, focused on finding one or more answers, one or more solutions, to the questions and problems of our time. The great protagonists of this issue tell us about it, each in their own way.

Each section, as usual, wants to bring a message for you as a gift. This message can be permeated with collaboration, innovation, emotions, memories, dreams, and a message of peace, which always resonates in our minds.

Sending you our warmest regards,

Space Newsletter Editorial Staff

OPEN CALL FOR CONTRIBUTIONS

Interested writers are requested to submit their article for the Space Newsletter.

1. SUBMIT YOUR ARTICLE PROPOSAL*
2. PROPOSAL VALIDATION
3. SUBMIT FULL ARTICLE
4. ARTICLE PUBLISHED

*VIA EMAIL AT **UNIVERSOLOSPAZIO@UNIRC.IT** AND IN THE FORM OF AN ABSTRACT (100 WORDS) SPECIFYING THE PROPOSED SECTION OF THE SPACE NEWSLETTER EVENTUALLY.

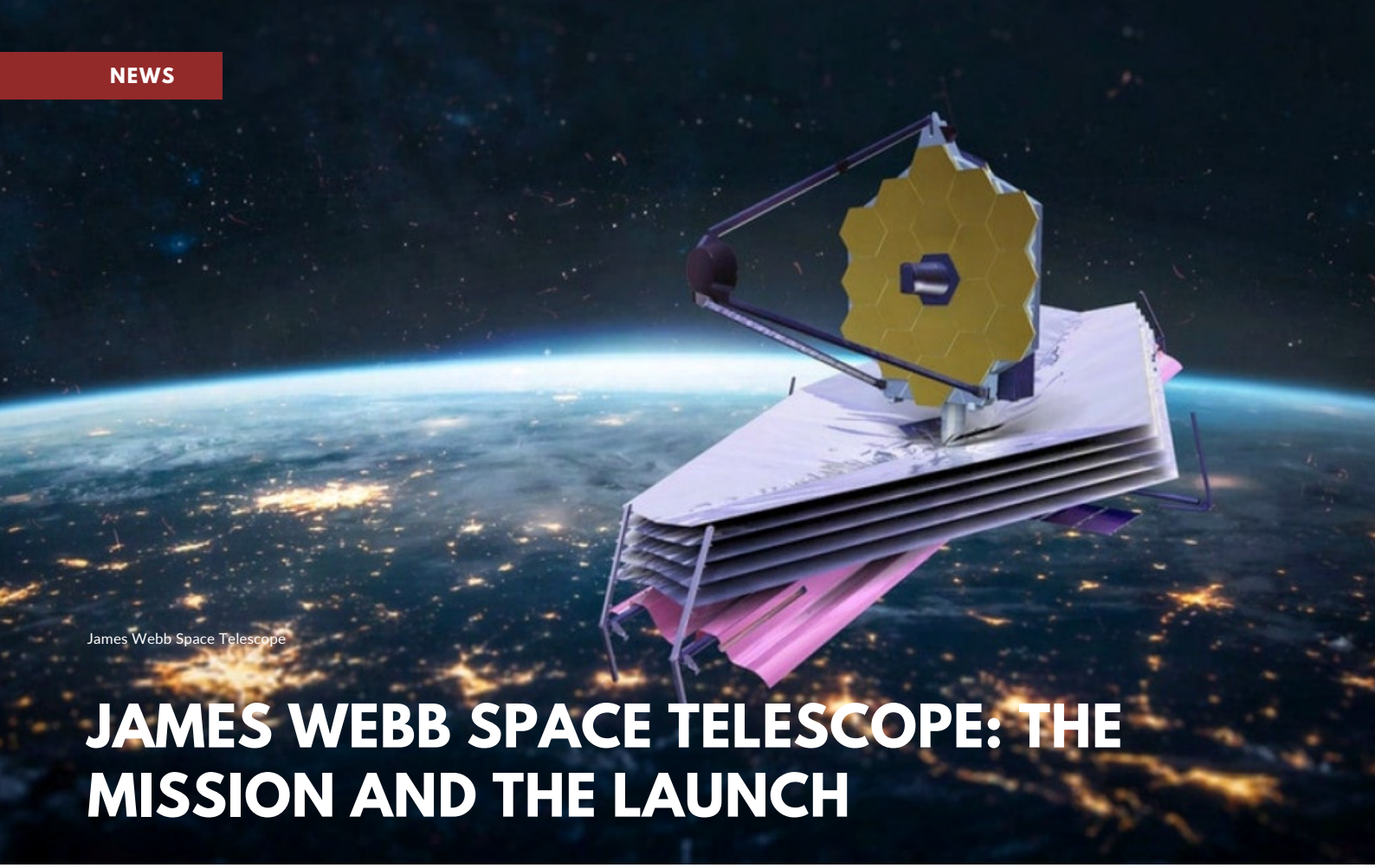
RESULTS OF ESA SPACE SUMMIT 2022

by Andrea Morabito,
Assistant Professor in Electromagnetic Fields, University Mediterranea of Reggio Calabria, Italy

High-level meetings have been held in Toulouse, France, in mid-February. European leaders confirmed their ambitious plans to work together to accelerate Europe's position as a world leader in space.
The meetings included the EU Competitiveness Council as well as the ESA Council and saw the intervention of the President of France Emmanuel Macron and the ESA Director General Josef Aschbacher.
The Government Minister for technological innovation and digital transition from Italy, Vittorio Colao, and the ASI President, Giorgio Saccoccia, attended the meetings.
The ESA, the EU, and their Member States are unifying their efforts to ensure that Europe makes full use of the enormous potential of space technology to address urgent and unprecedented social, economic, and security challenges.
Furthermore, the European leaders reaffirmed their strong political support of the three "accelerators" identified by ESA to address the challenges as the crisis caused by climate change and its consequences and the threats to essential European infrastructure in space and on Earth. The three accelerators are as follows:

- the "space for a green future" accelerator aims to use data derived from Earth Observation satellites to help Europe to mitigate climate change and support the achievement of a zero-emission economy;
- the "rapid and resilient crisis response" accelerator aims to make better use of space data, cognitive cloud computing and intelligent interconnectivity in space to support leaders in delivering crucial responses to the Earth's crisis;
- the "protection of space assets" accelerator aims to help prevent damage to the European space infrastructure and avoid disruptions to economically essential infrastructures, such as power grids and communication links, due to space weather conditions.

ESA's three accelerators are fully integrated with the EU Secure Connectivity initiative and the EU proposal on space traffic management. Individual ESA Member States and Associated States will be invited to support one or more of the three accelerators or elements. Government ministers and ministers responsible for space activities have also given a mandate to Josef Aschbacher, ESA Director-General, to initiate a discussion on an "inspirator" for human exploration (which already is a crucial capability of all major space powers except Europe). In addition, a high-level advisory group will be formed to report on progress at the next ESA Ministerial Council in November 2022, ahead of a space summit in 2023.



James Webb Space Telescope

JAMES WEBB SPACE TELESCOPE: THE MISSION AND THE LAUNCH

by Nadia Mammone,
Assistant Professor in Electrical Engineering, University Mediterranea of Reggio Calabria, Italy

Launched on December 25 2021, from Europe's Spaceport in French Guiana, The James Webb Space Telescope (Webb) is the next great space science observatory following Hubble, designed to answer open fundamentals questions about the Universe.

Webb was developed within an international project led by NASA in partnership with ESA and the Canadian Space Agency (CSA). Webb is the largest and most powerful space telescope ever launched.

Webb will orbit the sun, around the second Lagrange point (L2), a "permanent home", a gravitationally stable location in space, nearly 1.5 million kilometres from Earth, reached on January 24.

According to ESA, the nominal duration for the James Webb Space Telescope is five years, but the goal is ten years. In its first year, Webb will likely cooperate with its predecessor, the Hubble Space Telescope, launched in 1990. According to the Space Telescope Science Institute, the best images from Webb will start to appear about six months after launch. Science observations are then not expected to begin until this summer. Meanwhile, we can hint at what Webb will help the scientists investigate.

Equipped with four science instruments that will enable observations in visible, near-infrared and mid-infrared (0.6 to 28.5 micrometres) wavelengths, Webb is 100 times more sensitive than Hubble and will dive into the Universe's past deeper than ever before as it can detect infrared light generated by the birth of galaxies dating back to more than 13.5 billion years ago. Looking beyond, Webb will study the atmospheres of a wide diversity of known exoplanets (planets outside our Solar System), searching for atmospheres similar to Earth's. Webb's plans also include contributing to the Event Horizon Telescope's observations of the black hole at the centre of the Milky Way and a program to observe star formation currently hidden by layers of dust.

Webb is currently completing the first phase of the months-long process of mirror alignment. Let's keep our fingers crossed, waiting for exciting observations that could push our knowledge significantly farther than expected.

Galápagos Islands.

COSMO-SKYMED SECOND GENERATION TAKES TO THE SKIES AND GETS BIGGER

by Cosimo Ieracitano,
Assistant Professor, University Mediterranea of Reggio Calabria, Italy

The second COSMO-SkyMed Second Generation satellite (CSG), supported by the Italian Space Agency (ASI) with funds allocated by the Ministry of University and Research and the Ministry of Defence, was launched successfully on February 1, 2022, by a SpaceX Falcon 9 rocket at 00:11 a.m. CET from the Cape Canaveral Air Force Station in Florida. This launch signed a significant new milestone for Italy in Earth Observation, confirming the Italian industry's relevant skills (Leonardo and its joint ventures Thales Alenia Space and Telespazio, and several SMEs), which built the system.
It is worth mentioning that COSMO-SkyMed is the first constellation of satellites that for over fifteen years have been involved in monitoring the environment and the territory, safety, and the management of emergencies. The data collected by the COSMO-SkyMed radar satellites provide helpful information to support the daily lives of all citizens and protect and preserve our planet. Furthermore, the constellation allows measuring the impact of climate change, monitoring the management of natural resources, such as over-exploitation of agriculture and livestock farming, measuring urbanization, illegal waste, and managing water resources. The COSMO-SkyMed radar data also allows optimizing the classification of soils and monitoring crops during the growth cycle, optimizing crops, and observing monuments, historical buildings, or archaeological areas by studying their changes over time. CSG represents the state of the art of radar Earth Observation systems and, thanks to the technological innovations and new solutions introduced in the space and ground segments, it can guarantee significant improvements to the first generation (still in operation) in terms of performance, image quality, the efficiency of services and increased operational lifetime.

THE FIRST IMAGES OF COSMO-SKYMED SECOND GENERATION

"Don't be afraid to take risks. Work and prepare to be ready to seize opportunities."

SAMANTHA CRISTOFORETTI

Samantha completed her secondary education at the Liceo Scientifico in Trento, Italy, in 1996 after having spent one year as an exchange student in the USA. In 2001, she graduated from the Technical University of Munich, Germany, with a master's degree in mechanical engineering with specialisations in aerospace propulsion and lightweight structures. As part of her studies, she spent four months at the Ecole Nationale Supérieure de l'Aéronautique et de l'Espace in Toulouse, France, working on an experimental project in aerodynamics. As part of her training at the Italian Air Force Academy, Samantha also completed a bachelor's degree in aeronautical sciences at the University of Naples Federico II, Italy, in 2005. Samantha was selected as an ESA astronaut in May 2009. She joined ESA in September 2009 and completed her basic astronaut training in November 2010. She was then assigned to the role of ESA reserve astronaut, which allowed her to earn her initial qualifications in EVA and robotics, as well as the certification as flight engineer of the Russian spacecraft Soyuz. After completing her post-flight tasks, Samantha was given technical and management duties at the European Astronaut Centre, which included serving on technical evaluation boards for exploration-related projects. Samantha has been assigned a second mission to the International Space Station. She is currently in training for this mission, which is scheduled for 2022.
Source: ESA website

Pilot, engineer, astronaut, the first Italian woman in the crews of the European Space Agency, but also a philanthropist and Goodwill Ambassador of UNICEF Italy. On the eve of her departure for the "Futura" mission, she was the spokesperson for the message "There are no impossible feats, only extraordinary feats" - #impresastraordinaria. So, what does it mean for Samantha Cristoforetti to be a role model also in the dimension of social commitment?

«L'impresa straordinaria di andare nello spazio non è diversa da quella perseguita da UNICEF e altre organizzazioni internazionali, che ogni giorno, si impegnano a salvare un bambino o una bambina dalla malnutrizione, a salvaguardare il nostro pianeta, a prevenire conflitti, a togliere le persone dall'indifferenza. Cerco, dunque, di impegnarmi anche io, nel mio piccolo, in campagne sociali di alto spessore morale per invitare tutti e ciascuno a compiere imprese straordinarie: anche un piccolo gesto può fare una grande differenza per qualcuno che si trova suo malgrado in una situazione di vulnerabilità. E trovo che questo sia particolarmente importante quando parliamo dei bambini: esperienze di sofferenza, di trauma, di povertà vissute nell'infanzia lasciano segni anche permanenti nella psiche e possono ahimè contribuire ad alimentare catene di violenza che si trasmettono di generazione in generazione. È importante interrompere la catena, per questo ogni azione, anche piccola, può avere un grande impatto.»

«The extraordinary feat of going into space is no different from that pursued by UNICEF and other international organizations, which every day commit themselves to save a child from malnutrition, safeguarding our planet, preventing conflicts, taking away people from indifference. Therefore, I also try to engage myself, in my small way, in social campaigns of high moral depth to invite everyone to perform extraordinary feats. Even a small gesture can make a big difference for someone who finds himself in a situation of vulnerability. And I find this to be particularly important when we talk about children: experiences of suffering, trauma, poverty experienced in childhood also leave permanent signs in the psyche and can, alas, contribute to fueling chains of violence that are transmitted from generation to generation. Therefore, it is essential to break the chain so every action can significantly impact even a small one.»

"An important role was played by my character, the desire to know, to explore and to feel stimulated and tested."

How much and how did motivation, especially during the studies, stimulate self-determination in achieving important personal and professional goals?

«La motivazione è fondamentale nel dare il meglio di sé nel quotidiano e per me è stata una grande fortuna avere fin dall'infanzia il sogno di diventare astronauta, che in qualche modo ha guidato le mie scelte e mi ha aiutata ad accettare qualche rinuncia nel presente in virtù di un obiettivo futuro. Sicuramente un ruolo importante lo hanno avuto il mio carattere, la voglia di conoscere, di esplorare e di sentirmi stimolata e messa alla prova. Mi sono sempre impegnata molto nello studio, naturalmente, ma ho anche sempre cercato altre occasioni di formazione e sviluppo personale, come lo sport, i percorsi di studio in vari paesi, il lavoro durante le vacanze, le letture personali. Durante il mio percorso di studi ho sviluppato un interesse per la scienza e la tecnologia. Ho voluto studiato ingegneria aerospaziale all'Università Tecnica di Monaco di Baviera, in Germania. Ma finito il percorso di studi, mi sono presentata all'Accademia Aeronautica di Pozzuoli (NA), che mi ha selezionata e addestrata come pilota militare. Nel 2009 ho voluto partecipare al bando di selezione per astronauti dell'Agenzia Spaziale Europea (ESA) e sono stata tra i sei fortunati che sono stati selezionati. Nel 2014, dopo oltre cinque anni di addestramento, ho vissuto l'esperienza eccezionale di andare nello spazio.»

«Motivation is fundamental in giving the best of oneself in everyday life. It was a piece of extraordinary luck to have since childhood the dream of becoming an astronaut, which guided my choices and helped me accept some sacrifices in the present under a future goal. Indeed, an important role was played by my character, the desire to know, to explore and to feel stimulated, and tested. I have always been very involved in studying, of course. Still, I have also always looked for other training and personal development opportunities, such as sport, course of study in various countries, work during holidays, and individual reading. During my studies, I developed an interest in science and technology. I wanted to study aerospace engineering at the Technical University of Munich, Germany. But after completing my studies, I went to the Air Force Academy of Pozzuoli (NA), which selected and trained me as a military pilot. In 2009, I wanted to participate in the European Space Agency (ESA) call for astronauts, and I was among the lucky six selected. Finally, in 2014, after more than five years of training, I had the exceptional experience of going into space.»

What are the qualities and conditions that most helped you achieve your dream?

«La certezza di scegliere seguendo la mia volontà e non secondo le aspettative altrui. Serve, però, anche il talento, accompagnato dal duro lavoro. Questo mi ha permesso di realizzare il sogno di diventare astronauta. Non posso non citare, tuttavia, la mia famiglia, che è stata un tassello fondamentale della mia storia. I miei genitori mi hanno aiutata a scoprire e coltivare il mio vero interesse, mai imponendo limiti alle mie ambizioni. Senza di loro e senza le opportunità che mi hanno dato non avrei forse realizzato tutto quello che oggi sono. Inoltre, il sostegno e la pazienza quotidiana del mio compagno, in famiglia, con i bambini, con le mie assenze, con il mio impegno pubblico, è fondamentale per la mia serenità e per corroborare la mia determinazione.»

«The certainty of choosing by following my will and not the expectations of others. However, talent is also needed, accompanied by hard work. This allowed me to fulfil my dream of becoming an astronaut. Finally, however, I cannot fail to mention my family, which was a fundamental piece of my story. My parents helped me discover and cultivate my genuine interest by never imposing limits on my ambitions. Without them and the opportunities they have given me, I might not have achieved everything I am today. Furthermore, my partner's daily support and patience are fundamental in the family, with the children, my absences, and my public commitment, for my serenity and corroborate my determination.»

"I miei genitori mi hanno aiutata a scoprire e coltivare il mio vero interesse, mai imponendo limiti alle mie ambizioni. Senza di loro e senza le opportunità che mi hanno dato non avrei forse realizzato tutto quello che oggi sono."

Space is increasingly clogged with objects or pieces of disused objects, such as satellites, transport vehicles, engines, etc., to the point that more and more, we talk about the need for policies and rules that manage this matter. What's your comment?

«Si, quella degli space debris è una delle tematiche più dibattute negli ultimi anni dalle istituzioni nazionali, internazionali e anche dai soggetti privati, che investono nelle attività spaziali. Anche per la stessa ISS questo può diventare un problema, perché una penetrazione dello scafo da parte di un oggetto, anche piccolo, che si muove però ad elevata velocità relativa, può avere conseguenze catastrofiche. Dunque, vanno incoraggiati tutti coloro, politici, funzionari, giuristi, operatori del settore ad elaborare le condizioni giuste per mitigare e regolamentare e gestire questa dannosa spazzatura spaziale e, in generale, la congestione delle orbite terrestri più comunemente usate.»

«Yes, "space debris" is one of the most debated issues in recent years by national and international institutions and private entities that invest in space activities. Even for the ISS itself, this can become a problem because the penetration of the hull by an object, even a small one, which, however, moves at high relative speed, can have catastrophic consequences. Therefore, all those politicians, officials, jurists, and operators in the sector should be encouraged to develop the right conditions to mitigate, regulate, and manage this harmful space junk and, in general, the congestion of the most commonly used Earth orbits.»

What emotions characterized the training period as an astronaut and during the first mission in space, "Futura"? What are the new feelings on the eve of returning aboard the ISS?

«Come ogni prima volta, ogni cosa che vivi e che scopri è nuova e, a volte, non riesci a godertela fino in fondo, in particolare, quando l'addestramento è complesso, faticoso e a volte doloroso. Dunque, durante l'addestramento per la missione Futura, sicuramente ero emozionata, grata e determinata, ma il lavoro e la fatica hanno prevalso su tutto il resto. Adesso, che mi trovo a rivivere la preparazione per una nuova missione, cerco di affrontare pienamente ogni momento con la stessa determinazione, ma anche con la gioia di "tornare a casa", quella casa che mi ha ospitato per sei mesi l'ultima vota. Una casa che conosco, ma che sarà abitata da nuovi colleghi e, dunque, sarà diversa. La missione non è solo importante per la mia carriera personale, può essere un esempio e un traguardo per tante giovani donne in tutti i paesi, soprattutto, quelli dove i sogni sono più difficili e i diritti umani calpestati. Ho sentito che una ragazza in Afghanistan che studia di nascosto, perché i talebani hanno vietato alle donne di frequentare le scuole, vorrebbe fare l'astronauta. La strada verso i grandi obiettivi può essere lunga e faticosa. Sono contenta perché ho la consapevolezza di portare con me sulla ISS le storie di tante donne e tanti uomini. È una grande avventura e non vedo l'ora che inizi!»

«Like every first time, everything you experience and discover is new, and, at times, you can't fully enjoy it, especially when training is complex, tiring, and sometimes painful. So, during the mission "Futura" training, I was undoubtedly excited, grateful, and determined, but the work and fatigue prevailed over everything else. Now that I find myself reliving the preparation for a new mission, I try to face every moment fully with the same determination and the joy of "going home to" that house that has hosted me for six months the last time. A house that I know, but new colleagues will inhabit that and, therefore, will be different. The mission is not only important for my career, but it can also be an example, and a goal for many young women in all countries, especially those where dreams are more challenging, and human rights are trampled on. I heard that a girl in Afghanistan, studying in secret because the Taliban has banned women from attending schools, would like to be an astronaut. The road to big goals can be long and tiring. Nevertheless, I am happy because I am aware that I am taking the stories of many women and men with me to the ISS. It is a great adventure, and I can't wait for it to start!»

What advice would you give to those who would like to follow your path and how, in your opinion, the new generations can best prepare themselves to contribute to the advancement of the space sector?

«La motivazione e la determinazione sono dei requisiti fondamentali per raggiungere qualsiasi obiettivo. Nello specifico, penso sia importante essere curiosi, avere il desiderio di imparare cose nuove e perseguire il desiderio di fare qualcosa di utile per il futuro dell'umanità. Sentitevi responsabili del progresso. Non abbiate paura di rischiare. Lavorate e preparatevi per essere pronti a cogliere le opportunità. Il mio augurio alle nuove generazioni è quello di essere assettati di conoscenza, di credere nei propri sogni e nelle proprie capacità, perché con impegno, costanza, pazienza e un pizzico di fortuna, si possono realizzare cose grandi. Ma soprattutto non dimenticatevi di divertirvi: alcuni momenti sono unici, viveteli con pienezza.»

Finally, someone in Italy made your name as President of the Republic. What would you say about this proposal?

«Si è trattato senza dubbio di una boutade: la mia esperienza di astronauta non mi qualifica certamente per ricoprire quel delicatissimo ruolo istituzionale!»

«Motivation and determination are fundamental requirements for achieving any goal. Specifically, I think it is essential to be curious, have the desire to learn new things, and pursue the desire to do something useful for the future of humanity. Feel responsible for progress. Don't be afraid to take risks. Work and prepare to be ready to seize opportunities. My wish for the new generations is to be thirsty for knowledge and believe in their dreams and abilities because with commitment, perseverance, patience, and a bit of luck, great things can be achieved. But above all, don't forget to have fun: some moments are unique, live them fully.»

"Ma soprattutto non dimenticatevi di divertirvi: alcuni momenti sono unici, viveteli con pienezza."

PNRR FUNDS - PERSPECTIVE FROM THE ITALIAN SPACE AGENCY

The Editorial Staff had the extraordinary opportunity to interview Mario Cosmo, Science and Research Director of the Italian Space Agency.

A brief introduction to PNRR and “partenariati estesi"

«Il PNRR è una grande sfida ma anche un’opportunità unica per il nostro Paese. Il PNRR deve essere inteso come un investimento che il paese deve predisporre per il nostro futuro. Soprattutto verso il futuro dei giovani, in maniera tale da garantire una sostenibilità nel lungo termine. Ma come si investe nel futuro? Si investe principalmente in ricerca, in nuovi meccanismi di collaborazione tra il mondo della ricerca, dell’innovazione e la realtà industriale. Bisogna infatti, costruire due elementi portanti, il primo è il benessere inteso come posti di lavoro, una migliore e più efficiente università, nuovi corsi di laurea che siano più rispondenti ai bisogni che si prospetteranno in un prossimo futuro. Se da una parte c’è il benessere, dall’altra parte c’è il ruolo che la conoscenza può giocare nella sostenibilità degli investimenti. Il PNRR deve generare conoscenza. Perché il suo percorso attraversa il tempo e le persone. Nel momento in cui si pongono le grandi domande, si cercano delle grandi risposte, ma non ci sarà mai la risposta finale a quella domanda perché se ne genereranno altre. Nella fattispecie, abbiamo questo grande investimento che per quanto riguarda la ricerca viene articolato in una serie di bandi e iniziative. I centri di competenza, le infrastrutture di ricerca e innovazione e i partenariati estesi.»

"PNRR must generate knowledge because its path crosses time and people."

«The PNRR is a great challenge but also a unique opportunity for our country. The PNRR must be understood as an investment that the country must prepare for our future. Especially towards the future of young people, in such a way as to guarantee long-term sustainability. But how do you invest in the future? We mainly invest in research, in new collaboration mechanisms between research, innovation, and industrial reality. It is necessary to build two corroborating elements. The first is well-being, meant as jobs, a better and more efficient university, new degree courses that are more responsive to the needs that will arise shortly. If, on the one hand, there is well-being, on the other hand, there is the role that knowledge can play in the sustainability of investments. PNRR must generate knowledge because its path crosses time and people. When big questions are asked, they are looking for the big answers, but there will never be the final answer to that question because more will be generated. In this case, we have this large investment that is divided into a series of calls and initiatives as far as research is concerned. Competence centers, research and innovation infrastructures and "partenariati estesi".»

«Il ministero della Ricerca e dell'Università ha individuato diversi argomenti di grande attualità per i partenariati estesi e ha delineato un meccanismo di gestione e produzione di questa conoscenza: il cosiddetto schema hub-spoke. Il livello di sviluppo tecnologico richiesto è basso, si tratta di preparare dei prototipi e di elaborare nuove idee e successivamente, i prototipi dovranno diventare prodotti con un alto grado di innovazione. Come possiamo misurare l'innovazione? Se oggi il prodotto che uso ha una sua funzionalità, il nuovo prodotto dovrà avere una funzionalità e performance maggiore e/o un prezzo minore di produzione, o ancora una disponibilità maggiore. Dunque, l'innovazione si misura con vari parametri. Che cosa significa? Che noi dobbiamo preparare le nuove generazioni e coinvolgerli. Non dobbiamo mai dimenticare che il PNRR è un investimento per il loro futuro.»

«The Ministry of Research and University has identified several topical topics for "partenariati estesi" and outlined a mechanism for managing and producing this knowledge: the so-called hub-spoke scheme. The level of technological development required is low. It involves preparing prototypes and developing new ideas. Subsequently, the prototypes will have to become products with high innovation. How can we measure innovation? If the product I use today has its functionality, the new product must have greater functionalities and performance and/or a lower production price or even greater availability. Therefore, innovation is measured with various parameters. What does it mean? That we must prepare the new generations and involve them. We must never forget that PNRR is an investment in their future.»

«The Italian Space Agency wants to involve the excellence of our country. We have an excellent academic and research world distributed throughout the national territory. Therefore, we have a great opportunity that we must not let go of. Especially for young people, you have aspirations, ambitions, and projects above all. All of this is for you, and we cannot fail to meet your expectations. But this commitment will require your active contribution because the future is to be built together and requires dedication, study, and a sense of responsibility.»

What is the role and commitment of ASI in promoting collaboration between universities and research centers to promote development?

«L'Agenzia Spaziale Italiana vuole coinvolgere le eccellenze del nostro Paese. Perché sul territorio nazionale abbiamo un mondo accademico e di ricerca eccellente distribuito su tutto il territorio nazionale. Abbiamo una grande opportunità che non dobbiamo lasciarci sfuggire. Soprattutto per i giovani, perché soprattutto voi avete delle aspirazioni, ambizioni, progetti. Tutto questo è per voi e non possiamo venire meno alle vostre aspettative. Ma questo impegno richiederà il vostro attivo contributo. Perché il futuro è da costruire insieme e richiede impegno, studio e senso di responsabilità.»

University Mediterranea has long been committed to promoting space cooperation between Mediterranean countries with the support of ASI as well. We want to become a Geo-Information Hub in the Mediterranean, what can you suggest to us?

«Il Mediterraneo è uno dei luoghi più importanti del nostro pianeta. Lo è stato per secoli e lo continuerà a essere. Luogo di scambio, di grande attenzione geopolitica. C'è tutto il mondo intorno al Mediterraneo. Per cui l'ASI non a caso ha scelto l'Università Mediterranea di Reggio Calabria per portare avanti questo obiettivo che è trasversale. Include l'ingegneria, la fisica, per esempio, ma non solo. Questo è un altro errore che si fa spesso quando si pensa allo spazio, si ritiene che esso sia un club esclusivo per scienziati. Non è proprio vero. La bellezza di un centro quale quello che state predisponendo a Reggio Calabria, richiederà tante competenze. Richiederà il giurista, l'ingegnere, l'esperto in affari internazionali, e così via. Per cui è una grande occasione che non dobbiamo lasciarci sfuggire e richiederà tanto lavoro. Il Mediterraneo è però complicato. Lo è sempre stato e non diventerà più facile da trattare. Per cui non è un caso che lo faccia Reggio Calabria, che è centrale ed è stata esposta durante i secoli a tutto il territorio e conosce bene la materia. Dunque, l'ASI vi supporta e continuerà a farlo ma l'impegno che avete di fronte è grande.»

«The Mediterranean Sea is one of the most critical places on our planet. It has been for centuries and will continue to be — a place of exchange, of great geopolitical attention. There is the whole world around the Mediterranean. It is no coincidence that ASI has chosen the University Mediterranea of Reggio Calabria to pursue this transversal objective. It includes Engineering, Physics, for example, but not only. Another mistake often made when thinking about space is that it is an exclusive club for scientists. That's not true. The beauty of a center like the one you are setting up in Reggio Calabria will require many skills. It will require the jurist, the engineer, the expert in international affairs, etc. So, it is a great opportunity that we must not let slip, and it will require a lot of work. However, the Mediterranean is complicated. It always has been, and it won't get any easier to deal with. So, it is no coincidence that Reggio Calabria does it, which is central and has been exposed over the centuries to the whole territory and knows the subject well. Therefore, ASI supports you and will continue to do so, but the commitment you have in front of you is excellent.»

"There is the whole world around the Mediterranean. It is no coincidence that ASI has chosen the University Mediterranea of Reggio Calabria to pursue this transversal objective."

How can universities and research centers best contribute to this process?

«Bisogna eliminare i muri. Il territorio italiano, sebbene sia esteso è anche piccolo. Dobbiamo superare i provincialismi, le discriminazioni. Due persone intelligenti sono meglio di una! Ma poi soprattutto come dicevo prima, noi abbiamo un'ottima università e un ottimo sistema della ricerca. Bisogna creare la volontà e una disposizione a lavorare insieme. Il dialogo alla fine abbatte i muri e crea valore. Mi viene in mente quel concetto della conoscenza di cui parlavamo prima. Anche se io trovassi oggi una risposta a una delle grandi domande, subito dopo ce ne sarà un'altra ancora più difficile cui dare una risposta. Abbiamo la fortuna di avere tutto questo mondo della conoscenza distribuito su tutto il territorio. Ma fortunatamente sto assistendo a questo cambiamento. Vari atenei e centri di ricerca si stanno parlando. Oggi Milano parla con Reggio Calabria e Bari parla con Pisa, per esempio. Secondo me è un risultato importante aver capito che in un momento di grande competizione bisogna fare massa critica.»

«Walls must be eliminated. The Italian territory, although extensive, is also small. We must overcome provincialisms and discriminations. Two intelligent people are better than one! But then, above all, as I said before, we have an excellent university and an excellent research system. We need to create the willingness to work together. The dialogue breaks down the walls and creates value. That concept of knowledge we were talking about earlier comes to my mind. Even if today I find an answer to one of the big questions, soon after there will be another even more difficult one to answer. We are fortunate to have this whole world of knowledge distributed throughout the territory. But fortunately, I am seeing this change. Various universities and research centers are talking to each other. Today, Milan speaks with Reggio Calabria, and Bari speaks with Pisa, for example. In my opinion, it is a significant result to have understood that in a moment of great competition, we need to build critical mass.»

"We need to create the willingness to work together. Dialogue breaks down the walls and creates value. "

"Passion and the desire to go further cannot be ignored."

ROBERTO FURFARO

Roberto Furfaro is a Full Professor of Space Systems Engineering at the University of Arizona. He is director of the Space Engineering Research Laboratory (SSEL) and the Space Situational Awareness Arizona (SSA-Arizona) Initiative. He graduated in 1998 with honors in aeronautical engineering from the University of Rome "La Sapienza" and in 2004 received his doctorate in aerospace engineering from the University of Arizona. From 2000 to 2004, he was a project manager at NASA Space Engineering Center, Tucson, Arizona. From 2001 to 2004, he worked on the NASA Coffee Project at the NASA Ames Research Center. In addition, he was spokesperson with the Italian press for the NASA Phoenix Mission to Mars 2008 and Head of the Mars-Lunar Greenhouse Project (2010-2016 lunar and martian greenhouses) under the NASA Steckler Program. He recently led the systems engineering team for NASA OSIRIS REx Asteroid Sample Return Mission (2010-2016). He is currently the leader of the Target Follow-up team for the NASA Surveyor Mission. He has published more than 250 scientific articles in national and international journals and conferences. He was a member of the technical commission for Space Flight Mechanics (American Astronautical Society) and is currently a member of the technical commission for Space Surveillance (American Astronautical Society) and Astrodinamica (American Institute of Aeronautics and Astronautics). He is also a member of the Intelligent Control Commission for IEEE (Institute of Electrical and Electronics Engineers). In 2021 he received the prestigious "Da Vinci Fellow" award reserved for professors from the University of Arizona who have demonstrated high impact and contribution in national and international engineering. The asteroid WX 2003 was named "133474 Roberto Furfaro" in honour of him. In 2022, Prof. Furfaro was elected AIAA Associate Fellow.

«Credo che la mia storia personale sia un misto di passione, curiosità, ingegno, forza di volontà e voglia di andare oltre la stereotipica e provinciale credenza che “dal sud non si può”. Sono nato a Melito Porto Salvo e sono cresciuto in provincia di Reggio Calabria, più specificatamente a Roccella Jonica, da genitori nati e cresciuti nello stesso paese. Sin da piccolo ho sviluppato un forte e direi quasi innato interesse per la matematica, chimica e fisica e scienze affini. Mio padre dava lezioni private di tali discipline e io, ancora alle elementari e medie, passavo ore seduto ad ascoltare il discorrere di tali argomenti con ragazzi delle superiori. A casa mia c’era una enorme quantità di libri scientifici e ingegneristici di ogni genere: sin da bambino mi piaceva sfogliare pagine di libri di fisica classica e quantistica guardando con ammirazione equazioni di cui non avevo assolutamente idea di cosa significassero. Dal punto di vista curriculare, ho frequentato le scuole come un normale ragazzo italiano, ovvero scuola elementare, scuola media e superiori. La scelta della scuola superiore è caduta sull’Istituto Tecnico Industriale Statale (ITIS) “Ettore Majorana” di Roccella Jonica, con specializzazione in meccanica. La scelta è stata fatta considerando il mio interesse per l’ingegneria sia pratica che teorica e credo che sia stata fondamentale nel creare le fondamenta per il percorso futuro. Nel mentre, occhi sull’Università di Roma con l’idea di iscrivermi al corso laurea in ingegneria aeronautica ed eventualmente frequentare la famosa scuola di ingegneria aerospaziale post-laurea. Dopo il diploma, parto per Roma con tante speranze e sogni nel cassetto. L’inizio è difficile e l’impatto con la grande città, specialmente venendo da un piccolo paese del profondo sud, è davvero brusco. Dall’alto della sua storia millenaria, Roma guarda tutti con molto scetticismo e purtroppo con molto qualunquismo. Nonostante le prime difficoltà di ambientamento, rimane salda in testa l’idea di fare grandi cose nel campo spaziale e persistere con la voglia avere un grande impatto sul futuro dell’umanità. Negli anni Novanta, la laurea in ingegneria aerospaziale non esiste se non come corso post-laurea. Infatti, la mia laurea si articola come ingegneria aeronautica con indirizzo spaziale.»

«I believe that my personal story is a mixture of passion, curiosity, ingenuity, willpower and desire to go beyond the stereotypical and provincial belief that "from the South it is not possible". I was born in Melito Porto Salvo. I grew up in the province of Reggio Calabria, specifically in Roccella Jonica, from parents born and raised in the same country. From an early age, I developed a strong and almost innate interest in mathematics, chemistry, physics, and related sciences. My father gave private lessons in these disciplines, and I, still in elementary and middle school, spent hours sitting listening to the discussion of these topics with high school kids. In my house, there was an enormous amount of scientific and engineering books of all kinds. Since I was a child, I loved leafing through pages of classical and quantum physics books, looking with admiration at equations of which I had no idea what they meant. From a curricular point of view, I attended schools like an ordinary Italian boy: elementary school, middle school, and high school. The choice of high school fell on the State Industrial Technical Institute (ITIS) "Ettore Majorana" of Roccella Jonica, with a specialization in mechanics. I made the intention my interest in both practical and theoretical engineering, and I believe it was fundamental in creating the foundations for the future path. Meanwhile, eyes on the University of Rome. With the idea of enrolling in the aeronautical engineering degree course and possibly attending the famous post-graduate aerospace engineering school. After graduation, I leave for Rome with many hopes and dreams in the drawer. The start is complex, and the big city's impact is sharp, especially coming from a small town in the deep south. From the height of its millenary history, Rome looks at everyone with a lot of scepticism and, unfortunately, indifference. Despite the initial difficulties of setting, the idea of doing great things in the space field and persisting with the desire to have a significant impact on the future of humanity remains firmly in mind. Unfortunately, in the 1990s, the aerospace engineering degree did not exist except as a post-graduate course. Therefore, my degree is divided into aeronautical engineering with a specialization in space.»

«Questo mi consente di seguire le materie di ingegneria spaziale alla scuola di aerospaziale e creare la base per il futuro. Da un punto di vista puramente accademico, alla Sapienza gli esami vanno bene, ma qualcosa internamente mi dice che questo non è il mio posto naturale: se voglio davvero fare grandi cose devo andare negli Stati Uniti dove si trovano i migliori ingegneri e scienziati del campo aerospaziale. Dovevo trovare il modo di fare il “grande salto” e magari fare esperienze in laboratori di ricerca come la NASA dove si ideano e sviluppano missioni spaziali di esplorazione scientifica. Ne discuto con vari professori, assiduamente chiedendo se ci sono opportunità per fare un periodo di tesi in America. All’epoca la cosa era piuttosto rara e c’era molto scetticismo sulla mia richiesta, che sembrava cadesse inascoltata. Nonostante tutto non mi perdo d’animo e infatti l’occasione perfetta capita nel 1997 quando vado alla International Astronautical Conference (IAC) per incontrare l’allora direttore del NASA Space Engineering Research Center (SERC) situato a Tucson nel cuore dell’Arizona.»

«This allows me to pursue space engineering subjects at aerospace school and create the foundation for the future. From a purely academic point of view, at Sapienza, the exams are okay. Still, something inside tells me that this is not my natural place: if I want to do great things, I have to go to the United States, where the best engineers and scientists in aerospace are located. I had to find a way to make the "big leap" and maybe gain experience in research laboratories such as NASA, where space missions for scientific exploration are conceived and developed. I discuss it with various professors, assiduously asking if there are opportunities to do a thesis period in America. At the time, this was quite rare, and there was a lot of scepticism about my request, which seemed to go unheeded. Despite everything, I do not lose heart. The perfect opportunity came in 1997 when I went to the International Astronautical Conference (IAC) to meet the then director of the NASA Space Engineering Research Center (SERC) located in Tucson in the heart of Arizona.»

«Il NASA SERC era un centro di eccellenza specificatamente dedicato a missioni innovative per Marte dove si sviluppava tecnologia ISRU (In-Situ Resource Utilizzation) per la colonizzazione del Pianeta Rosso. In maniera diretta, che poi è tipica dell'approccio americano, e quasi sfacciatamente, chiedo se sia possibile passare un periodo al centro per sviluppare la tesi. Dopo qualche discussione sull'argomento di tesi, si parte alla volta dell'Arizona per lavorare su un rover capace di produrre propellente dall'atmosfera marziana, chiamato LoRPEx (Locally Refueled Planetary Explorer). Il rover era stato disegnato con un sistema a cella di combustibile che spezza la molecola di anidride carbonica e produrre propellente in forma di ossigeno e monossido di carbonio. LoRPEx era disegnato per volare su Marte usando un sistema di piccoli propulsori. Appena arrivato sono stato messo immediatamente alla prova per disegnare il sistema di guida e controllo del sistema di volo. Ho passato otto mesi entusiasmanti che mi hanno convinto che la mia strada è in USA. Dopo aver discusso la tesi a Roma ed ottenuto l'agognato 110 e lode, ritorno in Arizona dove vengo assunto dal NASA SERC come project manager per continuare il lavoro di ricerca su LoRPEx e contemporaneamente iniziare il dottorato (PhD) che completo nel 2004. Durante questi anni sono stato coinvolto e ho ideato una serie di progetti entusiasmanti che riguardano l'esplorazione spaziale ma anche in campi di ricerca che vanno dall'intelligenza artificiale, alla guida e controllo di veivoli aerospaziali, alla matematica applicata, al remote sensing. Un esempio è stato il mio coinvolgimento nel Famoso "NASA Coffee Project" dove con un team del NASA Ames Research Center, abbiamo fatto volare un drone a celle solari sopra l'isola di Kauai (Hawaii) per prendere immagini di piantagioni di caffè e usare sistemi intelligenti per informare gli agricoltori dove raccogliere il caffè maturo. Per il progetto, ho sviluppato una serie di reti neurali che consentivano di generare mappe di maturazione direttamente dalle immagini.»

"Still, something inside tells me that this is not my natural place: if I want to do great things, I have to go to the United States, where the best engineers and scientists in aerospace are located."

«NASA SERC was a centre of excellence dedicated explicitly to innovative missions to Mars where ISRU (In-Situ Resource Utilization) technology was developed to colonize the Red Planet. Directly, which is then typical of the American approach, and almost blatantly, I ask if it is possible to spend a period at the centre to develop the thesis. After some discussion on the thesis subject, we leave for Arizona to work on a rover capable of producing propellant from the Martian atmosphere, called LoRPEx (Locally Refueled Planetary Explorer). The rover was designed with a fuel cell system that breaks up the carbon dioxide molecule and produces propellant in the form of oxygen and carbon monoxide. LoRPEx was designed to fly to Mars using a system of small thrusters. As soon as I arrived, I was immediately tested to design the guidance and control system of the flight system. I spent eight exciting months that convinced me that my place is in the USA. After having discussed the thesis in Rome and obtained the coveted 110 cum laude, I returned to Arizona where NASA SERC hired me as a project manager to continue the research work on LoRPEx and at the same time start my PhD, which I completed in 2004.»

«Qui in Arizona mi hanno dato la possibilità di essere creativo e sviluppare sia missioni spaziali che tecnologia spaziale ad ampio raggio. Sono diventato professore di ingegneria dei sistemi spaziali, dirigo il mio laboratorio, lo Space Systems Engineering Laboratory, e sono direttore della Space Situational Awareness Arizona Initiative dove il gruppo da me diretto lavora con le forze spaziali americane per le osservazioni ed il monitoraggio di satelliti sia terrestri che nello spazio cislunare. Infatti qualche settimana fa, ho ricevuto un finanziamento di $7.5 milioni di dollari per identificare, localizzare e monitorare il traffico nel sistema Terra-Luna, chiamato spazio cislunare. Con le nuove missioni mandate dall'agenzia spaziale cinese e quelle programmate dal programma NASA ed altre agenzie spaziali, si prevede un incremento drammatico del traffico lunare che deve essere risolto. Il mio team sta creando e mantiene il primo catalogo comprensivo di oggetti in vicinanza lunare e darà il via al controllo del traffico oltre la sfera Terrestre. Nel campo dell'esplorazione del sistema solare, qui in Arizona, abbiamo fatto una serie di missioni per l'esplorazione sia di Marte che di asteroidi e comete. Infatti, nel 2008 abbiamo condotto con successo la NASA Phoenix Mission to Mars che comprendeva un sistema di atterraggio, un lander e una serie strumenti per l'analisi della superficie marziana.»

«During these years, I have been involved. I have conceived a series of exciting projects concerning space exploration and research fields ranging from artificial intelligence to the guidance and control of aerospace aircraft, applied mathematics, and remote sensing. An example was my involvement in the Famous "NASA Coffee Project" where with a team from NASA Ames Research Center, we flew a solar cell drone over the island of Kauai (Hawaii) to take pictures of coffee plantations and use intelligent systems to inform farmers where to harvest ripe coffee. I developed a series of neural networks that allowed maturation maps to be generated directly from images for the project.» Here in Arizona, they have allowed me to be creative and develop both space missions and wide-ranging space technology. I became a professor of Space Systems Engineering. I run my laboratory, the Space Systems Engineering Laboratory, and I am the director of the Space Situational Awareness Arizona Initiative where the group I lead works with the American space forces for the observation and monitoring of satellites both terrestrial than in cislunar space. A few weeks ago, I received a $7.5 million grant to identify, locate and monitor traffic in the Earth-Moon system, called cislunar space. With the new missions sent by the Chinese space agency and those planned by the NASA program and other space agencies, a dramatic increase in lunar traffic is expected that must be resolved. My team is creating and maintaining the first comprehensive catalogue of objects in the lunar proximity and will initiate traffic control beyond the Earth sphere.
In the field of solar system exploration, here in Arizona, we have made a series of missions to explore both Mars and asteroids and comets.»

«Dopo un viaggio di sette mesi, nel Maggio del 2008 siamo atterrati intorno alla zona del polo nord marziano per verificare e confermare la presenza di acqua sul pianeta rosso. Dopo aver scavato per 25 cm, per la prima volta nella storia, abbiamo preso ed analizato un campione di ghiaccio nel sottosuolo. Allo stato attuale, stiamo conducendo due missioni, ovvero NASA OSIRIS REx Asteroid Sample Return Mission,e la NASA NEO Surveillance Mission. In OSIRIS REx sono stato a capo dell'ingegneria del sistema per l'acquisizione ed il processo di tutti i dati scientifici della missione. Nel 2020 la sonda ha collezionato un campione dall'asteroiode Bennu ed è in viaggio di ritorno verso la terra dove riporterà il materiale nel 2023. Con la NASA NEO Surveillance Mission nel 2026 lanceremo un satellite nel punto di Lagrange L1 del sistema terra-sole e da lì mapperemo un numero maggiore del 90% di asteroidi e comete più grandi di 140 metri usando una camera agli infrarossi. Io sono a capo del Target Follow-up team dove stiamo sviluppando un sistema intelligente capace di processare dati della missione in tempo reale e autonomamente definire quali sono gli asteroidi pericolosi, chiamati "impactors", e dare comandi sia al satellite che a telescopi terrestri per il cosiddetto "follow-up". A parte l'esplorazione robotica, abbiamo anche lavorato allo sviluppo di serre idroponiche per sistemi biorigenerativi per basi lunari e marziane. Sono stato per anni a capo del progetto "Mars-Lunar Greenhouse" dove sotto il NASA Steckler Program, abbiamo disegnato e testato un sistema capace di produrre vegetali e contemporaneamente ossigeno ed acqua a ciclo chiuso. Tali serre saranno critiche per la colonizzazione umana del sistema solare, capaci di produrre cibo e ossigeno per la sostentazione autonoma di astronauti senza il bisogno di ricevere rifornimenti dalla terra.»

«In fact, in 2008, we successfully conducted the NASA Phoenix Mission to Mars, which included a landing system, a lander and a series of instruments for analyzing the Martian surface. After a seven-month journey, in May 2008, we landed around the Martian North Pole area to verify and confirm the presence of water on the red planet. After digging for 25 cm, we took and analyzed a sample of ice underground for the first time in history. We are conducting two missions, namely NASA OSIRIS REx Asteroid Sample Return Mission and NASA NEO Surveillance Mission. In OSIRIS REx, I was the head of system engineering to acquire and process all scientific mission data. In 2020, the spacecraft collected a sample from the asteroid Bennu and were on its way back to earth, where it will bring the material back in 2023. Then, with the NASA NEO Surveillance Mission in 2026, we will launch a satellite at the Lagrange point L1 of the earth-sun system, and from there, we will map more than 90% of asteroids and comets larger than 140 meters using an infrared camera. I am the head of the Target Follow-up team. We are developing an intelligent system capable of processing mission data in real-time and autonomously defining which are the dangerous asteroids, called "impactors", and giving commands to both the satellite and terrestrial telescopes to the so-called "follow-up". Aside from robotic exploration, we have also worked on developing hydroponic greenhouses for bio-regenerative systems for lunar and Martian bases. For years, I have been in charge of the "Mars-Lunar Greenhouse" project under the NASA Steckler Program; we have designed and tested a system capable of producing plants and simultaneously oxygen and water in a closed cycle. Such greenhouses will be critical to human colonization of the solar system, capable of producing food and oxygen for the autonomous sustenance of astronauts without the need to receive supplies from the earth.»

«La cosa importante è che questi sforzi e progetti sono riconosciuti. Per esempio, mi hanno appena nominato “Da Vinci Fellow”, un riconoscimento dato ad un professore universitario all’anno per essere leader nazionale ed internazionale nel campo dell’ingegneria spaziale. In onore del mio contributo alla esplorazione spaziale, l’asteroide 2003 WX è stato rinominato “133474 Roberto Furfaro”. E nel 2022 sono stato eletto “Associate Fellow” dalla American Institute of Aeronautics and Astronautics (AIAA) che è la più prestigiosa associazione americana per scienziati nel campo aerospaziale. Il futuro è costellato di sfide entusiasmanti che si collegano ai progetti discussi sopra. Per esempio, stiamo sviluppando sistemi di intelligenza artificiale con reti neurali che controllano satelliti, prendono decisioni e consentono l’atterraggio autonomo su pianeti di grandi e piccole dimensioni. Sistemi intelligenti che saranno anche capaci di far volare sistemi terresti a velocità ipersonica con velocità superiori a cinque o anche 10 volte la velocità del suono.»

«The important thing is that these efforts and projects are recognized. For example, I was awarded "Da Vinci Fellow", an award given to one university professor per year for being a national and international leader in space engineering. In honour of my contribution to space exploration, the asteroid 2003 WX was named "133474 Roberto Furfaro". And in 2022, I was elected "Associate Fellow" by the American Institute of Aeronautics and Astronautics (AIAA), the most prestigious American association for scientists in aerospace. The future is filled with exciting challenges that connect with the projects discussed above. For example, we are developing artificial intelligence systems with neural networks that control satellites, make decisions and allow autonomous landing on large and small planets. Intelligent systems that will also be capable of flying earth systems at hypersonic speeds with speeds greater than five or even ten times the speed of sound.»

«Spero che le nuove generazioni siano sempre più interessate a contribuire a vari livelli in queste sfide che possono proiettare l'umanità verso nuovi confini. È chiaro che non si può prescindere dalla passione e dalla voglia di andare oltre. Rispetto a quando son partito, ovvero 25 anni fa, le nuove generazioni fanno molte più esperienze all'estero che diventano critiche per espandere i priori punti di vista e fare ricerca ai più alti livelli. Magari riportare in patria le proprie conoscenze ed aiutare a far progredire il sistema italiano. Comunque, ormai non è possibile fare grandi cose senza confrontarsi con il mondo esterno e fare esperienze in altri paesi, scambiare idee con altri ricercatori e generare nuova conoscenza e tecnologia sia spaziale che in altri settori.»

Spero che la mia storia sia un piccolo contributo a stimolare le nuove generazioni a rompere gli schemi e cercare il posto migliore per dare il contributo alla nazione ed il mondo intero.

«I hope that the new generations are increasingly interested in contributing at various levels to these challenges that can project humanity towards new borders. Passion and the desire to go further cannot be ignored. Compared to when I left, that is 25 years ago, new generations have many more experiences abroad that become critical for expanding their prior points of view and doing research at the highest levels. Maybe bring back their knowledge and help to advance the Italian system. However, it is no longer possible to do great things without confronting the outside world, gaining experiences in other countries, exchanging ideas with other researchers, and generating new knowledge and technology in space and other sectors. I hope my story is a small contribution to stimulating the new generations to break the mold and look for the best place to contribute to the nation and the world.»

RANIA TOUKEBRI

Pioneer Award Winner in 2021 by SGAC in support of the United Nations Office of Outer Space Affairs

I have been a Space Systems Engineer working in the private sector in Germany for the past six years. I have been involved in designing and verifying mass memories, data handling units, on-board computers of satellites, and telescopes. In addition, I worked on exciting satellite missions managed by the European Space Agency on space exploration, planetary defense, and Earth Observation like Jupiter Icy Moons Satellite, Biomass Satellite, HERA satellite (the eyewitness of the first planetary defense exercise), Plato Telescope.

I got an engineering diploma in Instrumentations and Electronics in Tunis and continued my studies in France and Germany. After that, I took a Masters in embedded systems and computer science applied for space applications and started a PhD in autonomous space systems for the lunar and martian missions. In addition, I took certifications in strategic space law since I was interested in space law and others in business and management.

I have been an external expert evaluating H2020 projects with the European Commission and Delegate in the United Nations Committee of Peaceful Uses of Outer space during the Scientific and Technical subcommittees in 2018, 2019 and 2020.
I am Regional Coordinator of Africa in Space Generation Advisory Council supporting the development of the space sector in Africa and helping to build capacities and I have been selected as a Mentor for the United Nations Office of Outer Space Affairs Program: Space4Women.
I worked on research papers in cybersecurity in space, artificial intelligence, space strategy. In addition, I gave lectures at several events, webinars, workshops around the world about space systems, space strategy and future space missions.
I was awarded as top female aerospace engineer in Africa in 2018, top 10 under 30 in 2019, Top Outstanding Young Persons JCI in 2021, Influencing Women in Space during Space Week 2021 and Pioneer Award in 2021 by SGAC in support of the United Nations Office of Outer Space Affairs.

Being a woman from a country that did not have a space background did not stop me from achieving my dream, the path has been incredibly challenging, and every day brings more challenges.

In the middle of every difficulty lies opportunity

Albert Einstein

by the Editorial Staff

As in every edition, in this section, we collect opportunities for students. Aware that despite the difficult times we are facing, we will be able to find the strength to seize the favourable challenges for our future.

SGAC VACANCIES

Find many opportunities to be involved as an active member of the Space Generation Advisory Council (SGAC).

SGAC EVENTS

SGAC network is growing with more and more events worldwide. Take a look and participate at local, regional, international or webinar events.

SGAC SCHOLARSHIPS

SGAC and its partners host many scholarships for students and young professionals to attend several international events.

ESA CO-FUNDED RESEARCH

ESA offers to co-fund novel, space-related PhD and post-doctoral research activities.

ONLINE SPACE DEBRIS TRAINING COURSE 2022

ESA's Education Office is organising the fifth edition of ESA Academy's Space Debris Training Course. The Training Course will be held online between 16 and 25 May 2022.

ESA ACADEMY'S VERY FIRST CUBESAT SUMMER SCHOOL

ESA Education Office's latest initiative, the CubeSat Summer School 2022, takes place over four weeks from 8 August to 2 September 2022 at ESEC-Galaxia (Transinne, Belgium).

DOUBLE PERSPECTIVE ON THE 6TH MONTH PRESIDENCY OF EUROPEAN UNION'S COUNCIL IN THE DOMAIN OF SPACE

PRESENTED BY TWO DIFFERENT MEMBER STATES

FRANCE AND SLOVENIA

FRANCE22

PRÉSIDENCE FRANÇAISE
DU CONSEIL DE L'UNION
EUROPÉENNE

Emmanuel Macron, President of the Council of the EU

FRANCE

Diane de Sentenac and Céline Begon,
Space Attaché at the French Permanent Representation to the EU

"Recovery, Strength and a Sense of Belonging". Within this framework for the French Presidency of the Council of the European Union, the space policy agenda holds a special place. This period coincides with the celebrations of the 60th anniversary of the Centre National d'Etudes Spatiales (CNES), the French space agency. These 60 years also mark 60 years of European space construction.

The EU has established a dedicated space program around many flagships and components (Copernicus, Galileo/EGNOS, and Space Situational Awareness), which have become world benchmarks, allowing Member States and European industries to turn their vision into action. Under the impetus of the French Presidency, the EU will continue to build on these initiatives, fostering European innovation and strategic independence and consolidating its position in the competitive international arena.

Throughout these six months, the Presidency will initiate discussions on the future of Copernicus in the light of strategic and environmental changes, focusing on developing downstream applications derived from satellite data to help adapt to and mitigate the effects of climate change. France has made digital technologies a top priority and will work with its partners to outline the Secure Connectivity Constellation initiative tabled by the Commission. The roll-out of this new secure communication satellite infrastructure should help reduce inequalities in internet coverage across the EU. To strengthen Europe's ability to defend its interests, EU Member

States will also work to define a common European position on space traffic management. These priorities, seizing innovation opportunities to help European space address today's needs, will specifically be addressed at the informal meeting of space ministers and at the Copernicus Symposium in Toulouse on 16 February. ESA will also be present to identify the right synergies and ideal complementarity with the EU to ignite Europe's bold space ambitions.

Ariane 6, the future European space launcher

Urgent action is needed to tackle Europe's unprecedented societal, economic, and security challenges, from the climate crisis and its consequences to threats to crucial infrastructure in space and on Earth. Space has enormous untapped potential to help tackle these challenges and future crises while simultaneously creating jobs and boosting innovation in the European space industry. France is committed to making the momentum for the EU to act now and boost uptake of space applications."

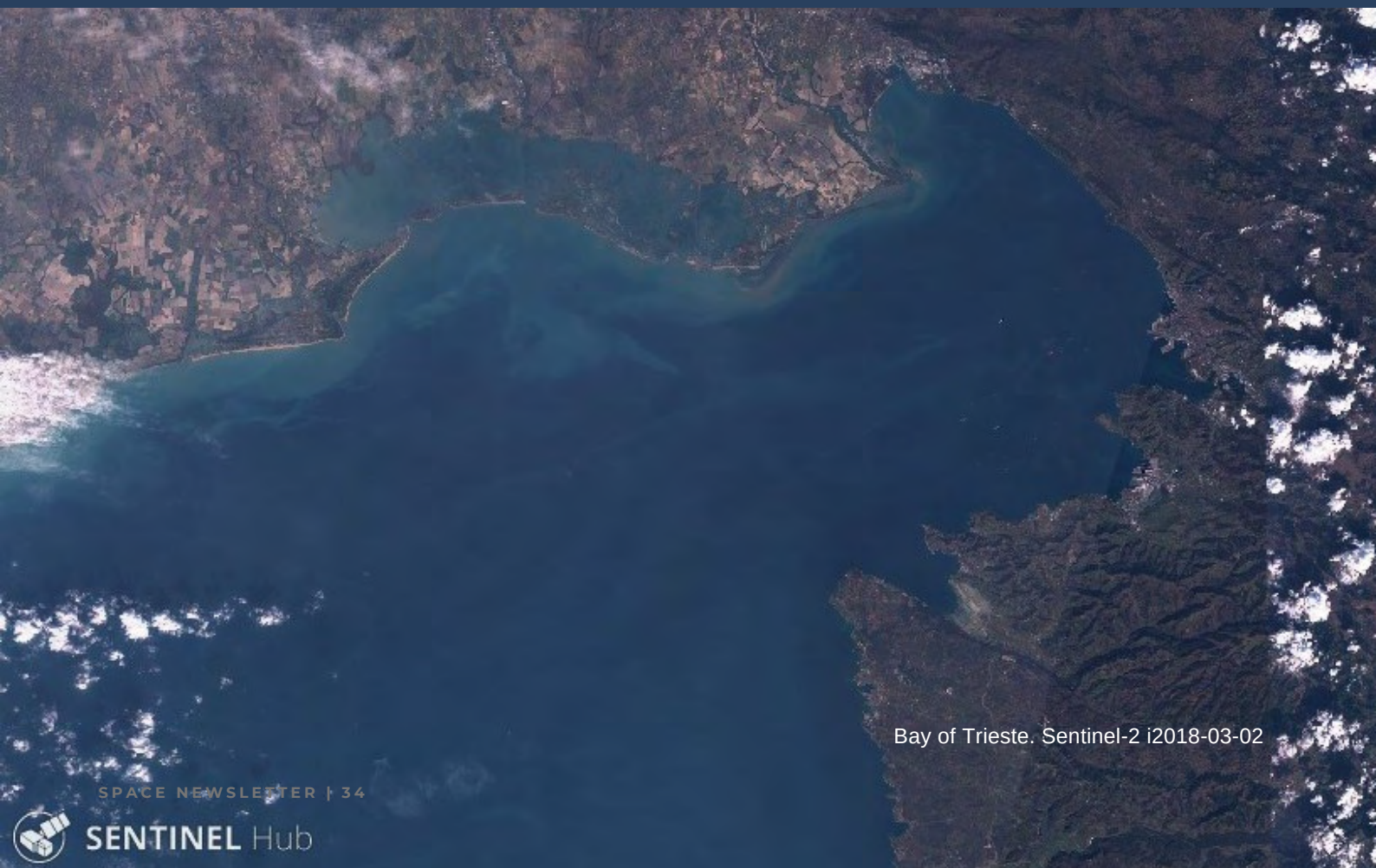
Galileo, the European Global Navigation Satellite System

SLOVENIA

By Mirjam Zdovc and Metka Urbas,
the Slovenian Delegation to ESA, Ministry of Economic Development and Technology

During the Slovenian presidency of the EU Council, we focused on the biggest challenges in space while also trying to address the issues of a small country. We promoted a more balanced distribution of benefits of space technology to everyone from everywhere in the EU. We were happy to see that most of the participants within the Space Working Party understood our point of view and were willing to support the idea. We intend to promote this vision further. Of course, we also dealt with important dossiers like Space Traffic Management (STM).

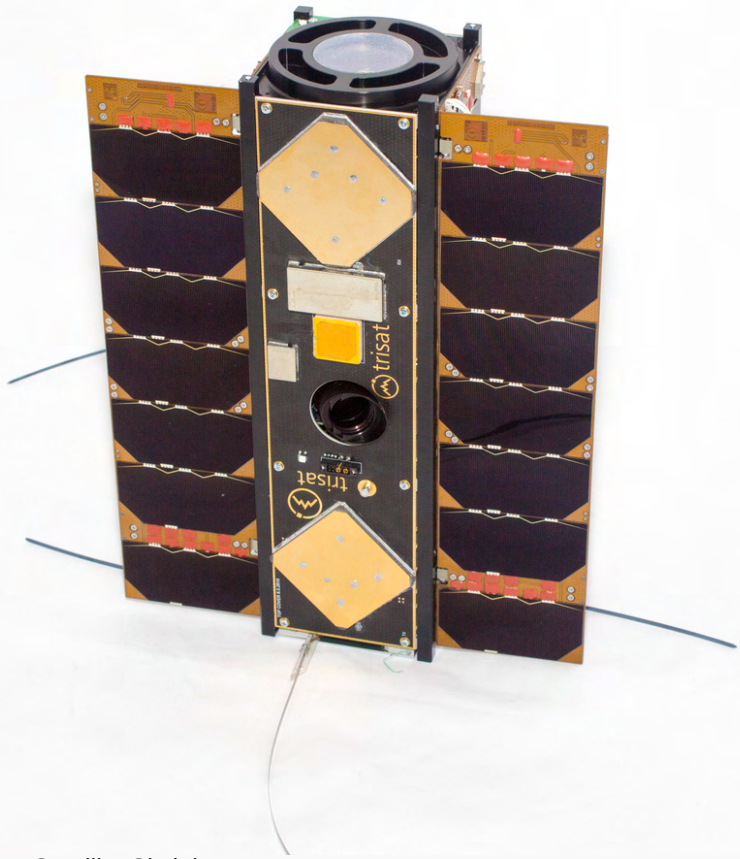
We prepared a Presidency report as a stepping stone towards the common EU strategy on the STM, and we maintained a dialogue on the new connectivity initiative for increased transparency.
We believe including SMS's and start-up companies in new developments can bring fresh ideas and energy to every segment. This is precisely the strength of the Slovenian space segment. Even though it is still small, it's growing at a fast pace, and it offers new innovative solutions that are of benefit to the people of Europe. One good example is a company Sinergise with their quick and easy to use platform for visualising satellite data, Sentinel Hub, or one of our satellites, Nemo HD, the only European satellite with operational video onboard. Based on the successful EU space programme like Copernicus, Slovenian companies and institutions built excellent competencies in space applications. Unfortunately, it is very challenging for small companies without previous projects to succeed in the Horizon programme.



Bay of Trieste. Sentinel-2 i2018-03-02

SENTINEL Hub

Our space segment started to expand when Slovenia joined European Space Agency, where companies could get the needed experiences. As a fast-growing sector, institutions dealing with space should be more open to new entrants bringing new ideas and innovative approaches.
During our Presidency of the EU Council, we established some new relationships within the EU and EUSPA that we will build upon in the coming years. On top of that, our goal is to create a robust bilateral relationship with some identified countries like Italy. We have already signed a Letter of Intent on Cooperation in space with ASI, and we look forward to seeing new exciting joint projects. As a diverse mixture of small and big states sharing similar visions regarding space, the Mediterranean area offers a unique opportunity to establish new partnerships and thus promote joint Mediterranean interests in the field of space.



Trisat Satellite Skylabs

Ground Station Space SI

ROCCO PALAMARA

Guided towards the UK by his passion for aerospace

I am Rocco Palamara, an Electronic Engineer with a big passion for aerospace. In my career so far, I have been lucky enough to work in the sector that I like. Since I was a child (maybe inspired by Buzz Lightyear), I have always been interested in flying to reach other planets to see what's there and meet other living beings to see how different they are from us. This is still unknown, but I am proud to contribute (in a way) to space exploration with my job. My career started in the first year of university because I took it seriously, almost like a job. In 2013, I completed my master's degree in electronic engineering at University Mediterranea in Reggio Calabria. I wrote my thesis about a MEMS piezoelectric sensor that I developed during an Erasmus placement at the Delft University of Technology in The Netherlands. Delft University does a lot of research in the aeronautical and space sector, so during my time there, I was exposed to some exciting projects that contributed to my passion for aerospace. After my degree, I decided to complement my technical background with some financial notions to prepare for the "world of work".

ROCCO PALAMARA completed his degree in electronic engineering at University Mediterranea in Reggio Calabria back in 2013. His studies included doing an Erasmus placement at Delft University of Technology in The Netherlands. It was here where Rocco completed his master thesis about MEMS piezoelectric sensors. After several months interning at an aerospace company, Rocco joined GE Healthcare as a manufacturing engineer working with the pharmaceutical supply chain. As part of his role, he moved from Milan to London so he could work from the UK manufacturing site. In 2020, Rocco moved back to the aerospace sector by taking a job as a Manufacturing Engineer at Chelton, an avionics manufacturing company and in 2022, Rocco was promoted to senior electronics engineer in the avionics department of Chelton. At Chelton, he is responsible for the electronic design of advanced aerospace electronic systems.

MQ-1C Grey Eagle Drone by General Atomics

For this reason, I attended an advanced master's course in Management, Innovation and Service Engineering at Scuola Superiore Sant'Anna of Pisa, where I had the chance to learn a lot about economics and management. I am glad I joined this course as it helped me grow a lot as an individual and allowed me to join Leonardo (formerly Finmeccanica) for a six-month internship. At the end of the internship, I decided to take a slightly different path than aerospace. So, I went to work for a big American corporation, General Electric, in their healthcare business. I joined the company in its Milan office, working for the Global Supply Chain department. As part of this role, I got the possibility to go and work abroad, so I decided to join the UK office based in London as a manufacturing engineer. In this role, I was responsible for producing synthesizer modules for PET radiotracers which were then outsourced to an external supplier. Here, I had a lot of exposure to all the regulations around the healthcare world and found this good for my career. In 2020, I decided to return to my "first love", the aerospace sector, by taking a job as a manufacturing engineer at Chelton (formerly Cobham Aerospace Connectivity), an aerospace and defence manufacturing company. After two years, I got promoted to senior electronic engineer in the avionics department. In this role, I can work on exciting projects, looking after the design of the electronic parts for anti-jam GNSS systems, direction finders, and GPS antennas with both military and civil applications. The main project I have been working on here is the development and manufacturing of an anti-jam GNSS system for the Gray Eagle Extended Range (GE-ER) Unmanned Aircraft System (UAS), the US Army's MQ-1C ER (picture below). This has been fascinating work. It's given me a lot of exposure to how aerospace companies work and visibility to the common technical problems that arise and need to be fixed to meet technical requirements. I am enthusiastic about the work that I am doing at Chelton. It makes me feel recognized as a professional and more as an individual. I would encourage every student to follow their ambitions as you can realize them with hard work and focus.

1ST INTERNATIONAL WORKSHOP ON

"The use of Artificial Intelligence for Space Applications"

www.aii2022.org

CO-LOCATED WITH THE
2ND INTERNATIONAL CONFERENCE OF
APPLIED INTELLIGENCE AND INFORMATICS (AII2022)

1-3 SEPTEMBER 2022
REGGIO CALABRIA, ITALY

by the Workshop Chairs,
Prof. Carlo Morabito (UNIRC), Prof. Roberto Furfaro (UA), Dr. Gabriella Arrgo (ASI), Dr. Marco Di Clemente (ASI)

Artificial Intelligence (AI) is becoming increasingly important in the space sector. Indeed, AI-based systems are contributing to several space operations including mission planning, big space data collection and processing, autonomous navigation, spacecraft monitoring and so on. The workshop "The use of Artificial Intelligence for Space Applications" co-organized by the University Mediterranea of Reggio Calabria (Italy), the UA Space Systems Engineering Laboratory, Arizona (USA), and the Italian Space Agency (ASI) (Italy), intend to examine the "dialogue" between AI and space and stimulate the exchange of ideas between researchers of these two fields.

This workshop invites researchers to submit their current space-oriented research (as well as comprehensive survey papers) that, in principle, can potentially lead to relevant advances in space sciences. The scope of this workshop includes but not limited to the following topics:

- AI for space and aerospace applications
- AI for fault detection and diagnosis in space applications
- AI for studying astronautics' neurodegeneration
- AI and learning systems for satellite communications
- AI and learning systems for space robotics
- IoT for space applications
- Space informatics
- Natural language processing in space applications
- Human-machine interaction systems in space applications
- Intelligent and optimal control for aerospace systems
- Intelligent search and optimization methods in aerospace applications
- Bio-inspired solutions for automatic navigation in space applications
- Sensors for space applications
- Space data processing for ground-based and onboard analysis

The workshop is part of the 2nd International Conference of Applied Intelligence and Informatics (AII2022, www.aii2022.org) and includes also invited speakers centered around specific themes and topics of AI in space.

Keynote Speaker: Prof. Alfonso Farina (Consultant to Electronic Division, Leonardo SpA – Roma, Italy)
Title: "Artificial Intelligence and Data Fusion Techniques applied to Space-based Global Maritime Surveillance. A look to deep learning and information from heterogeneous sensors."

IMPORTANT DATES

- **PAPER SUBMISSION: 1ST MAY 2022 (NO EXTENSION)**
- **PAPER ACCEPTANCE NOTIFICATION: 15TH JUNE 2022**
- **FINAL PAPER SUBMISSION & EARLY REGISTRATION: 1ST JULY 2022**
- **AII2022 IN REGGIO CALABRIA, ITALY: 1ST – 3RD SEPTEMBER 2022**

PAPER SUBMISSION

- **AUTHORS SHOULD SUBMIT PAPERS FOLLOWING SUBMISSION GUIDELINES**
- **ACCEPTED WORKSHOP FULL PAPERS WILL BE PUBLISHED AT THE SAME AII2022 PROCEEDINGS (SUBJECT TO REVIEW PROCESS)**

WOULD YOU LIKE TO BECOME PART OF UNIVERSO@LOSPAZIO TEAM?

DON'T MISS THIS OPPORTUNITY!

We are looking for a talented social media manager to administer our social media accounts and achieve our marketing goals. You will be responsible for creating original text and video content, managing posts and responding to our followers.

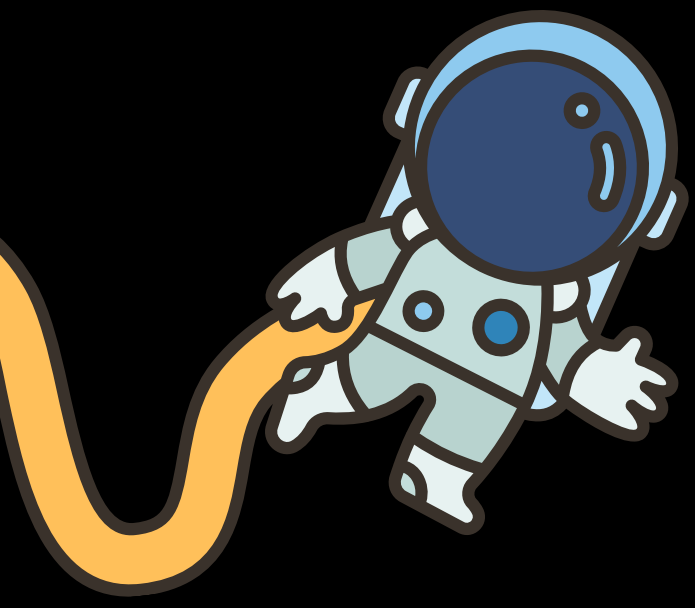
Send at universolospazio@unirc.it

- your CV
- a brief motivation letter (1 pag)

Deadline: Sunday, 24 April 2022, h 23:59

SPACE EVENTS

April 2022 - June 2022



SPACE GENERATION FUSION FORUM 2022

1- 4 APRIL 2022

Breakout sessions, expert panels, keynote presentations, and speed networking, where Space Generation Fusion Forum (SGFF) delegates will "fuse" their unique perspectives and backgrounds to formulate solutions to global problems of interest and importance to the space community. All outputs and contents produced by the discussions held during the SGFF are compiled into a report for the United Nations Committee on the Peaceful Uses of Outer Space.

Read more here

CYSAT 2022

6 - 7 APRIL 2022

SECOND EDITION CYSAT PARIS 2022

Considering the growing importance of cybersecurity and space, the second edition of this conference will reinforce its ambition to become a central node for the space industry. CYSAT aims to bring together the space and IT security communities to build a European ecosystem capable of responding to the current and future challenges the European space industry faces.

Read more here

YURI'S NIGHT

12 APRIL 2022

Launching parties worldwide every year around 12 April, in commemoration of Yuri Gagarin becoming the first human venture into space on 12 April, 1961, and the inaugural launch of the first Space Shuttle on 12 April 1981. We use space to bring the world together, empower the greatest parts of who we are, and give vision to where we are going.

Read more here

SPACE POWER WORKSHOP

25-29 APRIL 2022

The workshop provides an informal, international forum to exchange ideas and information on space power. The Space Power Workshop sessions include Power Systems Architecture, Power Management and Distribution (PMAD), Energy Generation, Energy Storage, Advanced Concepts, and SPW Lightning Talks covering topics of interest to professionals with all levels of expertise.

Read more here

Read more here

SMALL SATELLITES CONFERENCE

26-27 APRIL 2022

Adopting small, nano and cube satellite constellations has been driven by the commercial market – particularly for COMSATCOM – there is now growing consensus that architectures of military systems can and must include an architecture that will support LEO solution provision. The conference will explore economies of scale, small satellite production and design, regulatory considerations in the increasingly congested domain, and key programme updates from leading space agencies, militaries and commercial solution providers.

SPACE RESOURCES WEEK

3-5 MAY 2022

The Space Resources Week 2022, organized in Luxembourg, is a 3-day conference connecting thought leaders from the terrestrial resources sector, aerospace industry, financial institutions, research institutes and academia. It aims at understanding the technical and economic challenges facing in-situ resource utilization (ISRU) and elaborating recommendations for the future development of this high technology sector.

Read more here

GEOSPATIAL WORLD FORUM

9-12 MAY 2022

Geospatial World Forum 2022 is back with a mission to re-connect the supply and demand of geospatial capabilities across economic sectors through solution-based thematic programs, high-level roundtable meetings, workshops, and training.

Read more here

IAF GLOBAL CONFERENCE ON SPACE FOR EMERGING COUNTRIES GLEC2022

16-20 MAY 2022

Read more here

Following its mission to promote international development and share knowledge, the IAF and its member Sideralis Foundation are committed to fostering and supporting the international relations that allow space faring nations and space developing nations to share practices and data about space activities and their concrete social benefits. The comprehensive programme will include high-level keynotes, round tables as well for young professionals and students' dedicated sessions that will address the most recent achievements in space activities and cooperation for emerging countries and explore how industry, politics, and law will help shape the future of this exciting domain of astronautics.

LIVING PLANET SYMPOSIUM

23-27 MAY 2022

The event, which is held every three years, is organized with the support of the German Aerospace Center (DLR). This symposium focuses on how Earth Observation contributes to science and society, and how disruptive technologies and actors are changing the traditional Earth Observation landscape, which is also creating new opportunities for public and private sector interactions.

Read more here

ECSITE 2022

2-4 JUNE 2022

Everyone committed to inspiring people with science and technology is invited to join the largest European science engagement conference and meet with peers. The 2022 Ecsite Conference will be a unique professional development opportunity, offering an intense mix of intellectual stimulation, purposeful and creative sessions, business opportunities, and unparalleled networking: the spirit of the Ecsite community - creative, engaging, open and professional.

Read more here

AIXSPACE 2022

21-22 JUNE 2022

The space industry is experiencing an unprecedented development of innovation and technology, which is enabling a wider variety of applications and new use cases. Many stakeholders within the industry are now embracing artificial intelligence to push the limits in technology development and deliver value-added solutions to their customers. Euroconsult and Innovitech have chosen to combine their expertise to create AIxSPACE, the leading event dedicated to AI applied to space.

Read more here

9TH EUROPEAN CONFERENCE FOR AERONAUTICS AND SPACE SCIENCES EUCASS-3AF

27 JUNE - 1 JULY 2022

After 2020 for the aeronautical and space sectors, EUCASS-3AF 2022 will be an opportunity for the scientific community to renew direct scientific contacts and present its results and proposals for tomorrow's aeronautics and space in a world forced to change.

Read more here

SPACE FOR BOOKS

«Before Neil Armstrong walked on the moon, a group of professionals worked as "Human Computers", calculating the flight paths to enable these historic achievements. Among these were a coterie of bright, talented African-American women. Segregated from their white counterparts, these "colored computers" used pencil and paper to write the equations that would launch rockets, and astronauts, into space.
Moving from World War II through NASA's golden age, touching on the civil rights era, the Space Race, the Cold War, and the women's rights movement, Hidden Figures interweaves a rich history of mankind's greatest adventure with the intimate stories of five courageous women whose work forever changed the world.»

"There are twenty bright, highly capable...women in the West Computing Group, and we're proud to be doing our part for the country."

Katherine Johnson

SPACE POSTCARD

On March 26 in 2010

The bright star RS Puppis is swaddled in a cocoon of reflective dust illuminated by the glittering star. The star is 10 times more massive than our Sun and is 200 times larger. RS Puppis rhythmically brightens and dims over a six-week cycle. It is one of the most luminous in the class of so-called Cepheid variable stars. Its average intrinsic brightness is 15,000 times greater than our Sun's luminosity.

Star RS Puppis

Image Credits: NASA, ESA, and the Hubble Heritage Team (STScI/AURA)-Hubble/Europe Collaboration

«Cerchiamo di vivere in pace, qualunque sia la nostra origine, la nostra fede, il colore della nostra pelle, la nostra lingua e le nostre tradizioni. Impariamo a tollerare e ad apprezzare le differenze. Rigettiamo con forza ogni forma di violenza, di sopraffazione, la peggiore delle quali è la guerra.»

Margherita Hack, Astrofisica

UNI@VERSO LO SPAZIO

University Mediterranea of Reggio Calabria

universolospazio@unirc.it

@universolospazio

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