



Embassy of Italy  
Brasília



# Italian National Space Day 2021

DEC. 17 • 10:00 - 11:00 AM  
(BRASILIA TIME)

SPLASH, a scientific  
collaboration between Brazil  
and Italy in the space field

Moderator: Prof. Fabio Naro, Scientific Advisor, Embassy of Italy

## PROGRAM

10.00 – 10.05 Greetings

Fernando Pallini Oneto di San Lorenzo, Charge d'affaires - Embassy of Italy

10.05 – 10.45 Talks

Dr. Cristian Vendittozzi - Universidade de Brasilia (UnB)

"De-orbiting and re-entry systems: SoA and future applications"

Dr. Ignazio Dimino - Italian Centre for Aerospace Research

"Morphing technology for Adaptive deployable Aeroshells"

10:45-11:00 Discussion

MEETING LINK:

[HTTPS://PEDROMOURA-VVH.MY.WEBEX.COM/PEDROMOURA-VVH.MY/J.PHP?MTID=M031C51537C5AC8306CF0981356B9D5B9](https://pedromoura-vvh.my.webex.com/pedromoura-vvh.my/j.php?mtid=M031C51537C5AC8306CF0981356B9D5B9)

To celebrate the first Italian National Space Day, memorializing the launch of the first Italian satellite "San Marco 1" on 15 December 1964, this event will focus on ongoing scientific collaboration between Brazil and Italy in the space field, namely the SPLASH PROJECT (Self-DeDeployable FLeXible AeroSHell for de-Orbiting and Space Re-entry) between the Federal University of Brasilia and the Italian Centre for Aerospace Research.

As the importance of CubeSat payloads and missions increases, there is a growing interest in self-deployable and adaptive de-orbit and re-entry systems to enable reusable payloads and the return of scientific samples from Low Earth Orbit (LEO) by minimizing the hazards associated with potential on-orbit collisions and space debris. Their capability to adapt mission objectives and improve re-entry versatility can be very useful to develop new LEO space missions and contrast the growing phenomenon of the Space debris, by offering also great potential for more sustainable Lunar and Mars explorations. Morphing technology applied to self-deployable flexible aeroshells is increasingly emerging as an alternative approach to perform both de-orbiting and re-entry of CubeSat class spacecraft.

The project will deliver a demonstrator of new small deployable re-entry system, the so-called SPLASH. The possible utilization of the device is for safe Earth return of science payloads or data from LEOs, taking advantage of its adaptive shape memory alloy-based deploying system to perform re-entry mission. Furthermore, SPLASH can be very useful to contrast the growing phenomenon of the Space debris, enabling mini-satellites recover after the end of the mission, working only as an aero-brake in de-orbit configuration.

## *Biosketches of the participants*

- Dr. Cristian Vendittozzi is Associate Professor at Universidade de Brasília (UnB). He holds a PhD in Materials Engineering and a MSc in Aerospace Engineering, from Sapienza University (Roma). He is focusing his research in developing a meta-material that can be printed (3D) and that can be able to change shape if properly stimulated (+ 1D). A 4D material that can feel the changes taking place in the operating environment (by embedded photonic sensors) and to react by adapting itself (shape memory, morphing) to the new conditions. This research content is applied to the development of innovative deployable space systems. In 2019, he has been Invited Scholar at CIRA (The Italian Aerospace Research Centre) to deepen concepts related to morphing and adaptive structures. He is coauthor of 2 books, 3 chapter/book, about metallurgy and shape memory alloys, 15 articles published in scientific journals, more than 40 conference papers and 2 Italian patents.
- Dr Ignazio Dimino graduated with honors in Aeronautical Engineering at the University of Palermo and he earned his Ph.D. in Aeronautics from Imperial College of London. He was also visiting researcher at Center of Acoustics and Vibration of Penn State University, State College, (Pennsylvania) USA in 2008. He received the National Scientific Habilitation for the role of Associate Professor in the field of in Aerospace structures and design (ING-IND/04) in 2019. His technical background includes adaptive structures, wing morphing, smart actuation and active noise and vibration control, from conceptual design and early prototypes to final fabrication and testing. Currently, he is the Head of the Adaptive Structures Technologies Research Unit at the Italian Aerospace Research Centre (CIRA) and Project Manager in the field of Smart Structures. He is author of about eighty peer reviewed papers on adaptive structures, structural dynamics and vibro-acoustic control, which are cited about 450 times in the Elsevier's Scopus citation database and his H-index is 14. He is Editor-in-chief of the Journal of Adaptive Structures, edited by Science Publications, and he is co-author of two books and three book chapters.