

# *ASI experiments for the mission BEYOND: applications for a better life in space*

Giovanni Valentini  
ASI ISS Utilization Manager



Luca Parmitano



**beyond.**

**ESA astronaut**

Name: Luca  
Surname: Parmitano  
Birth date: 27-9-1976  
Nationality: Italian

Test pilot  
Triathlon athlete  
Italian Air Force lieutenant colonel

#beyond

The mission  
«Beyond»

Acoustic Diagnostics  
NUTRISS  
Amyloid Aggregation  
LIDAL  
MINI-EUSO  
XENOGRISS

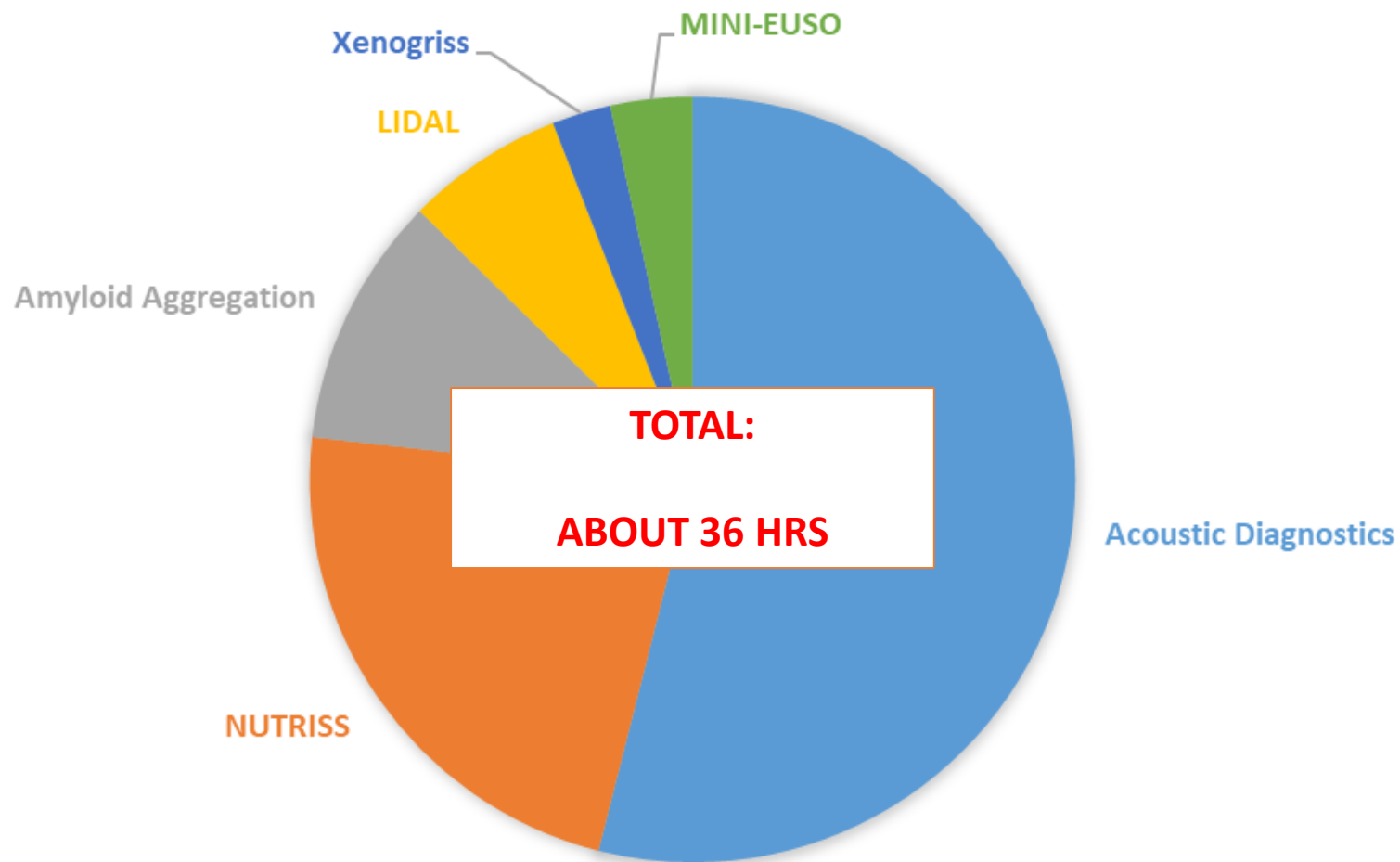
# Agreements in place for the mission Beyond

- 6 new payloads for the mission «Beyond»
- 3 payloads (Amyloid Aggregation, Acoustic Diagnostics, Nutriss) under ESA resources (ASI-ESA cooperation agreement)
- 2 payloads (LIDAL, Xenogriss) under NASA resources (ASI-NASA MoU)
- 1 payload (Mini-EUSO) under ROSCOSMOS resources (specific agreement)



# Resources utilization for Beyond

More than 50 experiments proposed by IPs.  
6 experiments proposed by ASI for a total of about 4 working days



# NUTRISS



## PI:

Gianni Biolo, Department of Medical Surgical and Health Sciences, University of Trieste, Trieste, Italy

## PD:

Kayser Italia s.r.l., Livorno

- The goal is to monitor of mass and body composition to maintain energy balance during the long-term spaceflight
- Pre and post-flight anthropometric, body composition and blood chemistry as well as energy intake data collection shall be performed
- In flight monitoring of body mass and composition through the Body Mass Measurement Device (BMMD) and a bioimpedance analyzer (BIA), respectively.
- Experiment conducted by Luca in 6 sessions during his mission



# Acoustic Diagnostics

**PI :**

Arturo Moleti, Physics Department, University of Roma Tor Vergata

**PD:**

Physics Department, University of Roma Tor Vergata, ALTEC S.p.A.



Agenzia Spaziale Italiana

- The goal is to evaluate possible hearing damage by comparing the results of several audiological tests performed on the astronauts before and after their mission, and by performing accurate otoacoustic emission (OAE) tests on a monthly base while on board the ISS.
- OAE measurement session on two astronauts (Luca Parmitano, ESA, and Andrew Morgan, NASA) during their mission on board the ISS (4-5 sessions)
- The astronauts set up and operate the experiment, guided by a user-friendly acquisition software
- Both ears tested in each session



Credits ESA



# Amyloid Aggregation

**PI:**

Cristina Casalone, S.C. Neuroscienze, Istituto Zooprofilattico Sperimentale del Piemonte Liguria e Valle d'Aosta, Torino

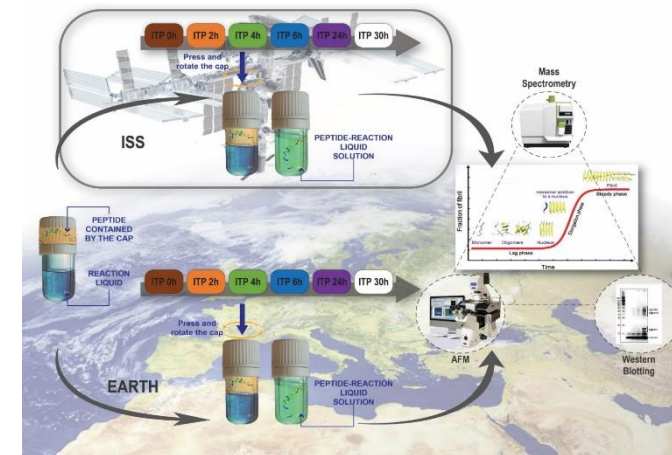
**PD:**

ALTEC S.p.A. – Torino

- Aim of this project: to assess possible increased predisposition to develop in space neurological diseases associated with protein aggregation such as Alzheimer's disease.
- disorders are characterized by the formation, in the brain, of ordered protein aggregates into amyloid plaques able to damage neural cells
- Amyloid  $\beta$  peptides of different size and propensity to aggregate were encapsulated in the cap of special jars
- Once on the ISS, the amyloid  $\beta$  peptides were mixed with the reaction fluid and kept for various interval of times (IT) at ambient temperature (ISS-Columbus module temperature) and then frozen to stop amyloid aggregation
- Results compared with data collected on Earth in same protocol recapitulating the same ISS conditions



Credits ESA



Experiment conducted by Luca in Aug 2019



# LIDAL

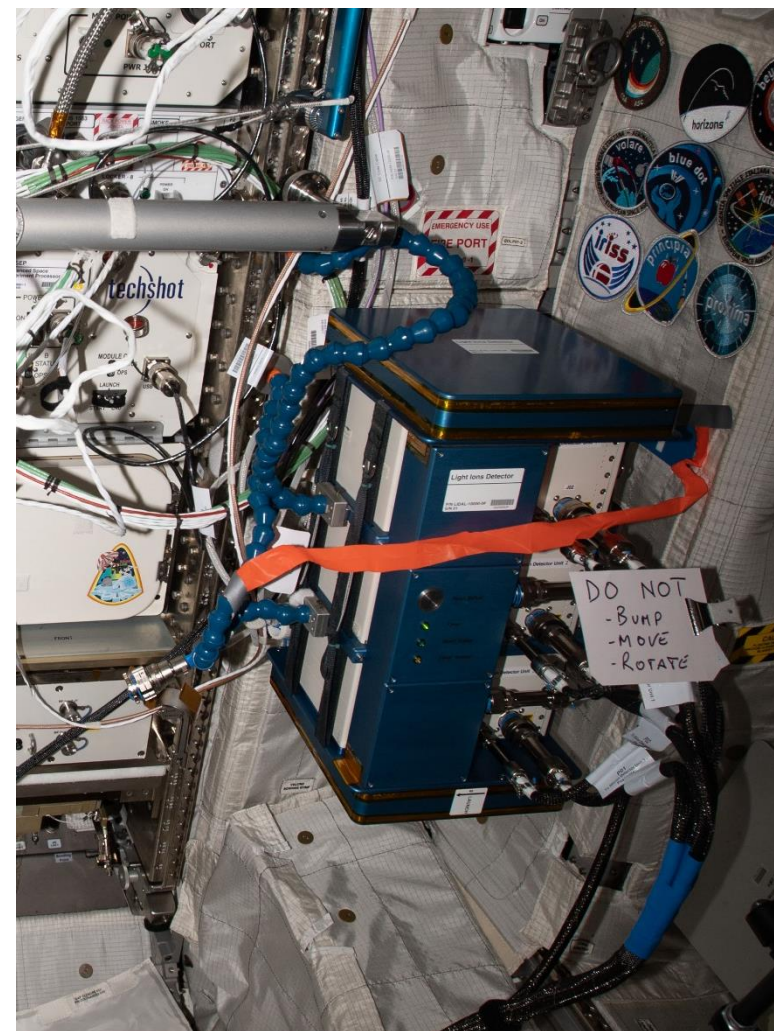


Agenzia Spaziale Italiana

**PI:** Livio Narici *University of Rome Tor Vergata,  
Department of Physics (URTV)*

**PD:** Kayser Italia s.r.l., Livorno

- The objective of the project is to provide a detector able to measure all the relevant radiation and to use it to study the radiation environment in the ISS during the next years when the solar activity is increasing toward the solar maximum.
- developed as an upgrade of the ALTEA detector system, extending ALTEA's measuring window to all the relevant charged components, and also to measure the velocity of each individual particle, largely enhancing the ability to distinguish the charge of each particle
- measurements in the Columbus module for at least 18 months (activation: jan 2020)
- data will be analyzed and downlinked in real-time on Earth where they will undergo further off-line analyses.



Credits NASA







Thank you!

[www.asi.it](http://www.asi.it)