

AGENCY

Alpbach Summer School students improve design for space mission to investigate our dusty Universe

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Earlier this year 60 European university students and young professionals attended the [Alpbach Summer School 2017](#), which is jointly organised by FFG and ESA, on the topic "Dust in the Universe". It offers them an intensive advanced training and working experience on different topics of space science each year.

Divided in four teams, the participants were set up to define the scientific objectives of a space mission to investigate dust that pervades the Universe and a preliminary end-to-end mission design including the spacecraft, scientific instruments, mission and science operations that had to meet the stated objectives. On the last day of the Summer School, each team presented a short mission study to a panel of experts.

All Summer School participants were then invited by ESA to apply to the Post-Alpbach Summer School Event 2017, an add-on to the Alpbach Summer School, in which the main objective was to improve the original design of the space mission elaborated by the Blue team in Alpbach.

19 university students from 12 different ESA Member States

have successfully completed the [Post-Alpbach Summer School Event 2017 held at ESA Academy's Training and Learning Centre, ESEC, Belgium, from 20 to 24 November 2017](#), where they further elaborated the PAHST (Polycyclic Aromatic Hydrocarbons Space Telescope) mission by the use of the Concurrent Engineering Approach.

— Students working together

The primary goal of the PAHST (Polycyclic Aromatic Hydrocarbons Space Telescope) mission is to obtain a complete view of star formation in the early Universe. This would be achieved by observing light that was originally ultraviolet, but was then absorbed by dust and re-emitted as infrared. As if this weren't ambitious enough, PAHST even has secondary objectives: to determine the structure of dense filaments in the galactic interstellar medium, and to observe brown dwarf stars and their surrounding dusty rings.

— Students during workshop

To help develop ideas for the hypothetical mission during this follow-up event, two ESA experts from ESA's Systems and Concurrent Engineering Section were on-hand to guide the

students in the Concurrent Engineering approach. In addition, two scientific tutors from the Alpbach Summer School 2017 supported the students with their science case.

As explains a British student from Imperial College London, "*Concurrent Engineering is a unique and enjoyable experience. The best part is seeing the mission coming to life: everyone inputs their design values, and the next thing you know, they appear before your eyes in a CAD model. The ESA experts helped us to optimise the ambitious aims of the Post-Alpbach mission, which proposes the largest and coldest mirror ever to be flown in space, and all of the students continued to develop the great working relationships from our time at the summer school.*"

According to the Concurrent Engineering approach, the students were divided into teams of two to cover the different aspects of the space mission, each working on one of the following subsystems:

1. Communication and Data Handling
2. Instruments and Remote Sensing
3. Power
4. Attitude and Orbit Control
5. Trajectory Analysis
6. Propulsion
7. Structure and Mechanisms
8. Configuration
9. Thermal

— Happy faces at the end of the workshop