Space / Industry

Science Mission & Spacecraft conceptual design

This METEOR supervised by Thales Alenia Space (TAS) aims at providing the major skills required to design a space science mission as a scientific primary investigator or as space system engineer, and to propose such a mission to a space agency. The competence acquisition will be based on the conceptual design of a space mission, as would be expected from a science consortium to propose a space mission to agencies. This METEOR is located at TAS, at Cannes La Bocca.

Objectives

by X. ROSER ET AL.

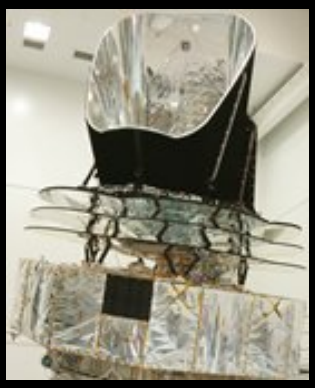
This METEOR supervised by Thales Alenia Space aims at providing future competences, required to design a space science mission as a scientific primary investigator, as an instrument scientist or as space system engineer:

• Science space mission context (customers, selection, funding and related constraints)

• Mission Architecture (spacecraft orbits and trajectories, spacecraft operational concept, ground control segment, science mission planning, management of spacecraft science data)

• Spacecraft architecture & conceptual design (functions and subsystems, estimation/pre-sizing of spacecraft subsystems and equipments, dependability and sizing loops). Systems and following subsystems will be coveredÊ: Guidance-Navigation & Control, Communication, Avionics, Power generation, Storage and distribution, Propulsion, Structure, Thermal control.

• Based on the analysis of examples of recent major science satellites (such as XMM, Herschel - picture above -, Hubble), overview and concepts of science instruments, estimation of key parameters (size, volume, mass), covering observation in various spectral ranges. The development approach and various aspects related to a space mission will be covered.



Approach: preliminary study of a space mission

The competence acquisition will be based on the conceptual design of a space mission, as would be expected from a science consortium to propose a space mission to agencies. A topic corresponding to current space science trends and objectives will be selected, such as exoplanets atmosphere spectral analysis, cosmic background wave polarisation observation, Near Earth Asteroid revisit, Trojan fly-by or remote sensing.

• The first step, will be based on a bibliographic research on some examples of recent science spacecrafts and the identification of how the science objective derived in the spacecraft design, what were the main functions and their design drivers. Exchanges with the tutor and a guided review of classical public space system engineering courses will enable to acquire the key spacecraft competences.

• The second step, will address the application of these competences, in the conceptual design and preliminary sizing of the selected new mission. This will be supported by using free ware tools, made available by space agencies.

• Finally these activities will be reported in the form of a typical science proposal to European Space Agency with an appendage providing the sizing methods and approaches followed. The evaluation of this activity will be performed on the basis of the final report evaluation and an oral presentation of each student personal contribution. This activity would be best performed by 2 or 3 students, collaborating but endorsing each clear roles and sharing the final report.

This METEOR will include 10 $\frac{1}{2}$ days courses (combining presentation and exchanges on the basis of public courses preliminary read by students and 2 visitsÊ: satellite integration centre and satellite operation centre).

Contact

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