Institute of Microgravity Ignacio Da Riva

IDR/UPM is a Research Institute of Universidad Politécnica de Madrid whose R&D activities aerospace technology include:

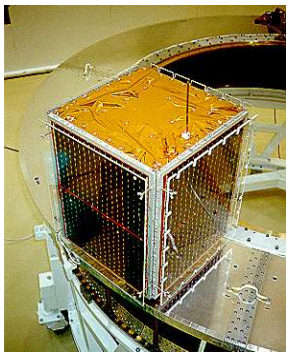
- Design, construction, qualification and operation of spacecraft.
- Payload development.
- Engineering support in subsystems such as thermal control, structures, attitude and orbit determination and control.
- Testing of space systems and equipment: thermal vacuum, vibrations.

IDR/UPM leads the Master in Space Systems (MUSE), a PBL official master course of UPM.

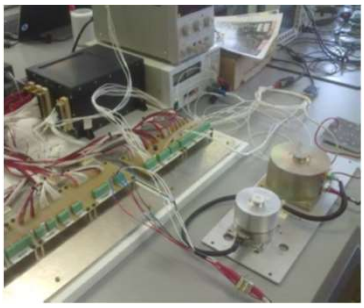
Facilities and infrastructures

- Integration clean room.
- Space environment test facilities:
  - Shakers:
    - ✓ Electrodynamic shaker with a hydrostatic-bearing slip table. For horizontal and three-axis testing and a loading capability of 17 kN.
    - ✓ Electrodynamic shaker for vertical vibrations of up to 7 kN.
  - Thermal vacuum chamber: 1 m^3 useful testing volume, up to $5x10^{-6}$ mbar and temperature range from – 150 °C to 150 °C.
  - Functional tests.
- Concurrent Design Facility: integrated tool to perform systems engineering and mission design analysis in the early mission stages in a reduced time frame.

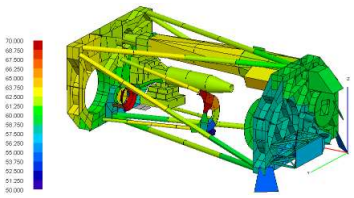
Research areas associated with Big Science



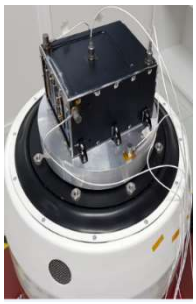
Mission analysis and design



Attitude and orbit determination and control



Thermal control



Space structures and mechanical systems

Main projects in Big Science

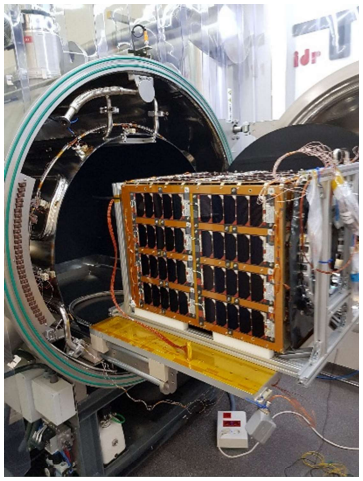
- ***UPMSat-2**: microsatellite (50 kg) fully developed at IDR/UPM to be launched in March 2020.*
- ***UPMSat-1**: microsatellite (50kg) fully developed at IDR/UPM launched in 1995.*
- ***Solar Orbiter mission** (ESA-NASA) instruments PHI and EPD: thermal control and structural design. To be launched in February 2020.*
- ***ExoMars 2016 mission** (ESA-Roscosmos) instrument NOMAD: thermal control and structural design. Launched in 2016.*
- ***Rosetta mission** (ESA) instrument OSIRIS: thermal control. Launched in 2004.*
- ***ARIEL mission** (ESA) Telescope Assembly: thermomechanical design. To be launched in 2028.*
- ***GALILEO**: EU funded project to set-up a GALILEO Information Centre in Chile.*

Collaboration with Large European Scientific Facilities

- ***ESA**: design, development, integration, launch and operation of micro-satellites (UPMSat-2 and UPMSat-1).*
- ***ESA-NASA**: development of the thermal control and structural subsystems of two different instruments of the Solar Orbiter mission, launched in January 2020 (Solar Orbiter mission).*
- ***ESA-Roscosmos**: development of the thermal control and structural subsystems of the instrument NOMAD (ExoMars mission).*
- ***ESA-OSIRIS**: development of the thermal control subsystem of the instrument OSIRIS (Rosetta mission).*
- ***ESA**: development of the thermal control and structural subsystems of the instrument ARIEL (Ariel mission).*
- ***GALILEO**: performance of a market study of different countries in the region to evaluate the possibilities of utilization of Galileo in different sectors and with different applications.*

Software, tools or licenses to be applied to Big Science

- *Simulation tools (PATRAN/NASTRAN, ESATAN, CATIA, ESACRACK, ESACOMP, VAONE, etc.).*
- *Concurrent Design Facility OCDE (Open concurrent Design environment).*



UPM contact:

Gustavo Alonso Rodrigo
gustavo.alonso@upm.es