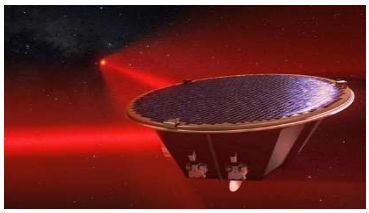
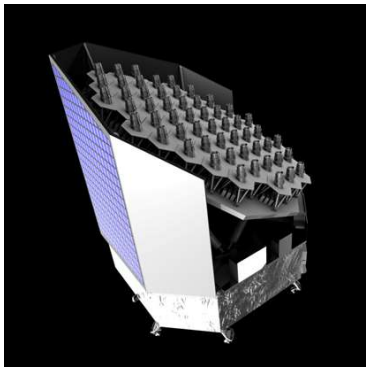
Group on Astrophysics and Cosmology

This is a young group composed by researchers with a large experience in ESA space missions at different levels of responsibilities, and the exploitation of their space data for astrophysical and cosmological studies.

They have been involved in different ESA proposals (Eddington, Planet Vision, Plato, etc.), past ESA missions (CoRoT, Plank), and approved ESA missions at different construction levels (CHEOPS, LISA, Plato2.0), from the PI responsibility (Planet Vision) to the coordination of working groups, and scientific team membership.

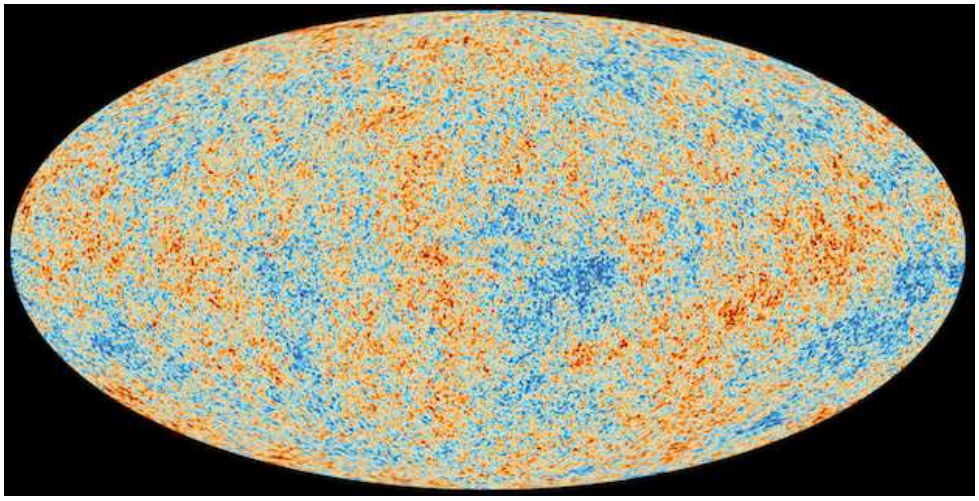
Facilities and infrastructures



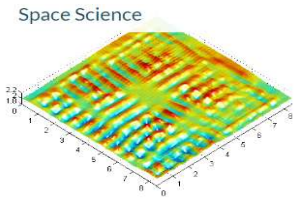


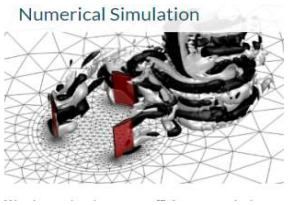
This research group is involved in the software development and the scientific exploitation of different ESA space telescope missions. The facilities and infrastructures needed for achieving its goals can be covered by the standard facilities of every researcher at the UPM:

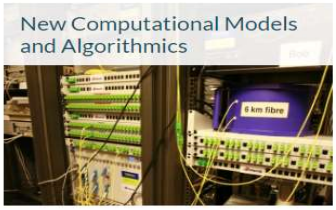
- Personal laptops and desk computers.
- Missions webpages and wikis for the activities coordination, such as:
  - https://www.elisascience.org/.
  - https://sci.esa.int/web/Planck.
  - https://sci.esa.int/web/plato.
- Finding from different sources such for activities support.
- UPM computer clusters for intensive calculation and modelling.



Research areas associated with Big Science







Main projects in Big Science

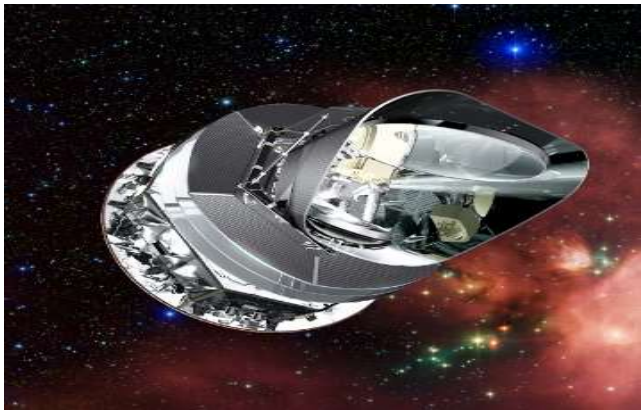
- ***ET (Einstein Telescope)*** *- ESFRI proposal: European research infrastructure for a next-generation Gravitational Wave Detector. Member of the Spanish Working Group that submitted the ET proposal to the ESFRI Roadmap 2021. The ET- ESFRI candidature has been officially supported by UPM and the Spanish Ministry of Science and Innovation.*
- ***CARMENES@CAHA****: Spectrograph at the Calar Alto Observatory for the discovery and characterization of exoplanets. Member of the scientific team.*

Collaboration with Large European Scientific Facilities

- ***ESA - LISA (Laser Interferometer Space Antenna)****, L3 Mission: launch expected 2034: associated member of the Cosmology Working Group of the LISA Consortium since January 2019. Contributing to two science projects on Primordial Black Holes:* CosWG_2019.01.18_PBH-Review and CosWG_2019.01.18_PBH-Tools.
- ***ESA - Plato2.0****, M3 Mission: launch expected 2028: coordination of the WP128.300 (Light curves preparation for asteroseismology), and member of the WP125.000, 121.130, and the Plato Input Catalog team.*
- ***ESA – CHEOPS****, S1 Mission: launch expected 2019: coordination of the asteroseismic exploitation of its light curves.*
- ***ESA – HAYDN****: answer to the next ESA Voyage 2050 call for proposals.*
- ***ESA – LISA****: black holes, gravitational waves and fundamental physics: a roadmap (White paper of the COST Action "Gravitational Waves, Black Holes, and Fundamental Physics") L. Barack, et al. Classical and Quantum Gravity 36 N.14, 143001, 178 pg, (2019).*
- ***ESA – Gaia****: abundance to age ratios in the HARPS-GTO sample with Gaia DR2. Chemical clocks for a range of [Fe/H]. E. Delgado-Mena, A. Moya, et al. Astronomy & Astrophysics, Volume 624, id.A78, 24 pp. (2019).*
- ***NASA – TESS****: unveiling the power spectra of δ Scuti stars with TESS. The temperature, gravity, and frequency scaling relation. S. Barceló-Forteza, A. Moya, et al. Astronomy & Astrophysics, Volume 638, id.A59, 11 pp. (2020).*

Software, tools and licenses to be applied to Big Science

- ***RGraCo****: An R code for modelling stellar pulsations.*
- ***THOT****: An R code for stellar characterization and stellar dating using machine learning techniques and massive datasets.*



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