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Oral

Here we present the concept feasibility study of the Galileo Solar Space Telescope Mission (GSST Mission) proposed by the Heliophysics, Planetary Sciences, and Aeronomy Division (DIPHA) of the Brazilian National Institute for Space Research (INPE). The study was conducted at the Space Missions Integrated Design Center (CPRIME - Centro de Projeto Integrado de Missões Espaciais) of INPE´s Space System Division (DIDSE). The GSST shall contribute to the understanding of the evolution of the magnetic structure in the outer layers of the Sun and its influence on the Earth's space environment. The scientific observations requirements proposed for the mission include high spatial and temporal resolution observations. Those measurements involve observations of the magnetic structure of the photosphere and outer layers of the solar atmosphere through the solar cycle, observations of the variability of the total solar irradiance, and in situ observations of magnetic field and high energy particle fluxes within the Earth's magnetosphere. The concept feasibility study, which was carried out during the second half of 2017, included: (a) the definition of the scientific objectives, requirements, and restrictions of the mission; (b) the identification of the system drivers; (c) the definition of the candidate solutions for the system; (d) the conceptual design of the mission's architecture components, including the optical payloads; (e) the pointing accuracy analysis of the designed attitude control subsystem; (f) the simulation and verification of the mission operational concept; (g) the assessment of the ground segment required to fulfill the mission; (h) estimate of the schedule for the development of the mission; and (i) the risk analysis. The optical payload architecture, orbit, and ground segment were identified as the main system drivers. The concept of two full disk telescopes and one high-resolution telescope for visible and ultraviolet spectropolarimetric observations have been the basis for the solution of the optical payload architecture selected for scientific purposes. For optimizing the solar visibility and the data downlink, the study has considered two orbits as possible: a sun-synchronous Low Earth Orbit (LEO), and a Geosynchronous Orbit (GEO). Each solution implies an exclusive spacecraft layout development. We point out that the cost analysis is still preliminary due to the lack of a similar mission in INPE's portfolio. Finally, the limitations of the concept and future strategies to implement such a mission in a challenging funding environment as the current Brazilian scenario shall be addressed.
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