

The *Hera* Saturn Entry Probe Mission: a Proposal in Response to the ESA M5 Call

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Abstract

The *Hera* Saturn entry probe mission is proposed as an ESA M-class mission to be piggybacked on a NASA spacecraft sent to or past the Saturn system. *Hera* consists of an atmospheric probe built by ESA and released into the atmosphere of Saturn by its NASA companion Saturn Carrier-Relay spacecraft. *Hera* will perform in situ measurements of the chemical and isotopic composition as well as the structure and dynamics of Saturn's atmosphere using a single probe, with the goal of improving our understanding of the origin, formation, and evolution of Saturn, the giant planets and their satellite systems, with extrapolation to extra-solar planets. *Hera* will probe well into and possibly beneath the cloud-forming region of the troposphere, below the region accessible to remote sensing, to locations where certain cosmogenically abundant species are expected to be well mixed.

The *Hera* probe will be designed from ESA elements with possible contributions from NASA, and the Saturn/Carrier-Relay Spacecraft will be supplied by NASA through its selection via the New Frontier 2016 call or in the form of a flagship mission selected by the NASA "Roadmaps to Ocean Worlds" (ROW) program. The *Hera* probe will be powered by batteries, and we therefore anticipate only one major subsystems to be possibly supplied by the United States, either by direct procurement by ESA or by contribution from NASA: the thermal protection system of the probe.

Following the highly successful example of the *Cassini-Huygens* mission, *Hera* will carry European

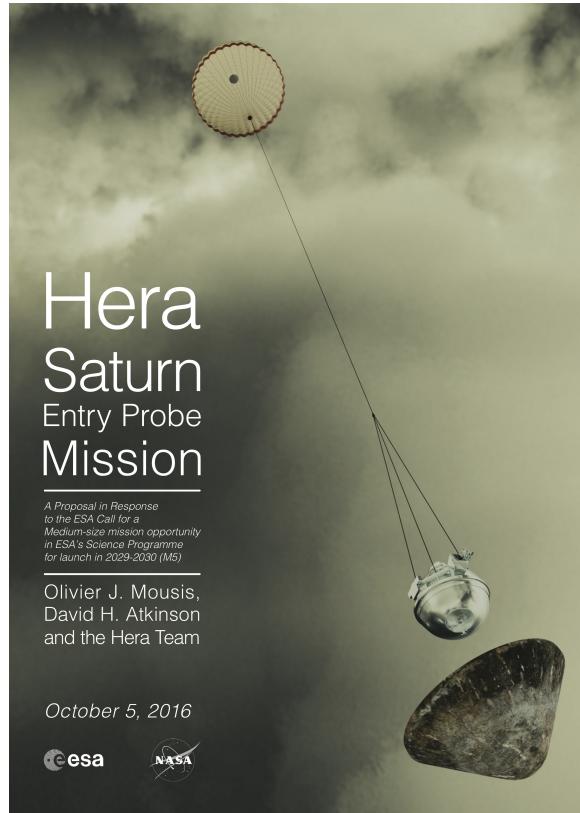


Figure 1: Cover of the Hera Saturn probe proposal submitted to ESA (illustration by Dr. Tibor Balint).

and American instruments, with scientists and engineers from both agencies and many affiliates participating in all aspects of mission development and implementation. We refer the reader to [1] for a full description of the science payload aboard the Hera probe. A Saturn probe is one of the six identified desired themes by the Planetary Science Decadal Survey committee on the NASA New Frontier's list, providing additional indication that a Saturn probe is of extremely high interest and a very high priority for the international community.

References

- [1] Mousis, O., and 43 colleagues 2016. The Hera Saturn entry probe mission. *Planetary and Space Science* 130, 80-103.