



The Europa Microprobe In Situ Explorer (EMPIE)

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The latest discoveries and scientific results by both the Galileo Spacecraft and Hubble Space Telescope have generated an increasing interest in the exploration of Jupiter and its Icy Moons, especially Europa. Following this growing interest, the *Science Payload and Advanced Concepts Office* of the *ESA Science Directorate* has selected the exploration of the Jovian System as the focus of one of their *Technology Reference Studies*, under which the EMPIE study has been framed.

Traditionally, planetary exploration has been performed by large, high resource spacecrafts. For in-situ exploration, surface elements such as rovers and landers are usually very complex and require a large allocation of resources. They also present high risks, due to the technical difficulties of landing. There is therefore a growing interest in the development of planetary probes, which can be implemented at lower cost and risk, and can be seen as precursors to larger and more complex systems. The EMPIE, *Europa Microprobe In-situ Explorer*, aims to exploit the scientific exploration of Europa with a microprobe network approach. The study foresees the deployment of a number of microprobes from a Europa orbiting spacecraft, with total mass of only 20kg. The probes will penetrate the icy surface of Europa to a depth of around 75cm, and will perform scientific measurements for up to a week (depending on the selection of the power source).

This paper will outline: the technical feasibility of a Microprobe Mission for Europa Exploration, a preliminary system design of the probe mission; as well as the key and enabling technologies needed for the mission in a short to mid-term time frame (3 to 6 years).

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