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COMET INTERCEPTOR: A DARING MISSION TO A LONG PERIOD COMET OR AN  
INTERSTELLAR OBJECT

**Abstract**

Abstract: Comet Interceptor is an upcoming European Space Agency (ESA)-led mission in partnership with the Japanese Space Agency (JAXA). The main objective of the mission is to explore for the first time a long-period comet, preferably dynamically new. The latter are comets that enter the inner solar system for the first time, and as such, are expected to be much less processed/evolved than comets that have come close to the Sun on multiple occasions. They are believed to have lost few of their primordial materials through sublimation and outgassing, and will have not undergone substantial surface modification. Visiting a long period comet, particularly one that is dynamically-new, would provide us with a unique view of the conditions at the outer solar system during its early development. The mission shall encompass one main spacecraft (provided by ESA) with two smaller ones initially attached to it (one provided by ESA, and another by JAXA). The mission is planned for launch in 2029 along with the ESA ARIEL Exo-planetary mission. The spacecraft would travel to the second Sun-Earth Lagrange point (L2) and remain there until a suitable new object is discovered from Earth. Advances in Earth-based survey telescopes and facilities such as the upcoming Vera Rubin Observatory greatly improve our detection capabilities of long-period comets, and provide us with a realistic chance of discovering a new object early enough to set up a realistic trajectory to explore it. Once a viable target had been chosen and a trajectory has been planned, the mission would leave the Lagrange point and head to the object. Prior to arriving to our target, the three spacecraft would separate to fly by the target body simultaneously, making various measurements and observations, thereby providing a unique multiple 3D perspective of the nucleus and its coma. Alternatively, given the recent visits of interstellar objects to our solar system, the discovery of such an object with a trajectory that is feasible for Comet Interceptor would provide us with a chance to explore such a body in close proximity for the first time ever. The mission shall include a suite of instruments to acquire information about the comet's structure, surface composition and morphology, coma gas composition, and solar wind interaction. The instruments are to be provided by consortia of institutions in Europe and Japan. During the meeting, we plan to discuss the mission further, and provide updates on the state of its development.