

Comet Interceptor mission to a dynamically new comet

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'Comet Interceptor' is a proposed mission to the recent European Space Agency (ESA) call for F-class ('fast') missions. This is one of six mission concepts invited to submit detailed proposals. A decision is expected until late July 2019. The purpose of our mission is to characterise a dynamically-new comet or interstellar object like 'Oumuamua, which are visiting the inner Solar System for the first time, including its surface composition, shape, and structure, the composition of its gas coma for the first time. Our mission will launch to the Sun-Earth L2 point, where it will be stayed in a stable L2 halo orbit for a period of up to 2-3 years, until a suitable opportunity for a flyby mission to a dynamically new comet presents itself. Suitable targets will be comets that will have a perihelion distance closer than ~ 1.2 au and an ecliptic plane crossing time and location reachable with ~ 1.5 km/s Δv from L2. Once a target is found, which is expected to be within a few years based on predictions for comet discovery rates with the Large Synoptic Survey Telescope (LSST), the spacecraft will depart on an intercept trajectory. Before the flyby, the main spacecraft will release at least two sub-spacecraft, parallel paths through the coma and past the nucleus to be sampled. This mission will give us a 3D snapshot of the cometary nucleus at the time of the flyby, testing spatial coma inhomogeneity, interaction with the solar wind on many scales, and monitoring of Ly α coma. This mission will be a unique measurement that was not possible with previous missions, in addition to the fact that we will target a dynamically new comet, which will allow interesting comparisons to be made with the results from Rosetta target comet 67P/Churyumov-Gerasimenko. It is expected that the proposed mission includes contributions from Japan as well as ESA member countries.

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