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ENVISS (ENTIRE VISIBLE SKY CAMERA) FOR COMET INTERCEPTOR MISSION

Abstract

The EnVisS (Entire Visible Sky camera) instrument is s an intensity and polarimetric imager, part of the payloads of the European Space Agency Comet Interceptor mission. The aim of the mission is the study of a dynamically new comet, i.e. a comet that never travelled through the solar system, or an interstellar object, entering the inner solar system. As the three-spacecraft system mission passes through the comet coma, the EnVisS instrument maps the sky, as viewed from the interior of the comet tail, providing information on the dust properties and distribution. EnVisS is mounted on a spinning probe and the full sky is entirely mapped thanks to a very wide field of view optical design selected for the EnVisS camera. A fisheye optical layout has been selected because of the required wide field of

view (180°x45°). Thanks to the trajectory of the spacecraft though the coma and its spinning, it will be possible to recreate a 3D map of the coma. To achieve the scientific requirements, the instrument has been designed to study the comet dust environment, including its polarimetric properties in the spectral band 550 nm 800 nm. EnVisS features a push-broom/push-frame imaging technique, so acquiring slices of sky while the probe rotates in order to create an image of the full sky. The EnVisS optical head provides a high resolved image to be coupled with a commercial space-qualified detector featuring 2k x 2k pixels with pitch 5.5μm. The design includes a dedicated filter, to allow polarimetric and intensity acquisitions. Dedicated electronics and software have been developed in order to achieve the objectives. The paper presents an overview of the design and performance of the entire instrument from a system view, including the design phase from the scientific requirements to the final configuration and the integrated STM.