

CuPID Experimental License Application

File #: 0047-EX-CM-2022

Question 6: Statement of Research Project

- a) A description of the nature of the research project being conducted.

The Cusp Plasma Imaging Detector (CuPID) satellite provides a soft X-ray imager platform in Low Earth Orbit (LEO). CuPID will observe space plasma processes that are important for our understanding of space weather. Plasma accelerated by these processes can collide with Earth's upper atmosphere, and these collisions produce X-rays; CuPID will measure these X-rays to answer previously inaccessible questions about the large-scale properties of Earth's space environment.

- b) A showing that the communications facilities requested are necessary for the research project.

The primary ground station detailed in this filing is installed at the Boston University Photonics building. The purpose of this facility is to communicate with the CuPID satellite in order to obtain telemetry that will provide satellite health and status as well as the payload experimental test data. This facility is necessary to recover this payload experiment data from the satellite in a timely manner as inputs to research work that will be carried out at the University. In addition, the facility allows command of the payload to maximize science yield - the region of primary interest is very small and mobile, so selection of data for download must be guided by summaries of stored experimental data. The secondary ground station detailed in this filing is the Wallops Flight Facility at Wallops Island. This location will be utilized for testing and as a secondary downlink to retrieve additional data.

- c) A showing that existing communications facilities are inadequate.

Boston University chose to install its own ground station at their facility as a primary option. There is no existing facility at the University or in the surrounding area that can provide real-time telemetry and commanding in UHF. Existing NASA facility at Wallops Island will be utilized for initial link testing and as a secondary option due to the complexity of return data to the University in a timely manner.