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DESIGN OF A DUST COUNTER FOR THE EARTH-MOON CHALLENGE PAYANKEU SAILCRAFT

Abstract

The idea of using photons to propel spacecrafts through the solar system became conceivable since Johannes Kepler understood the effect of solar rays on comet tails in 1619. This mode of propulsion, often considered as atypical, is in fact based on principles which are more intuitive than jet engines and which remind of the image of sailing.

The University of La Reunion has initiated the global project of a small solar sailcraft Payankeu in order to take part in the Earth-Moon solar sail challenge. This challenge is to reach the far side of the Moon in one and half a year by operating several ever-increasing elliptical orbits around the Earth. The range of probes following this scheme that have studied the circum-terrestrial space between geostationary and lunar orbit is quite limited, and this area remains fairly unexplored. By placing a small cosmic dust counter on the sailcraft Payankeu, the aim is to get better understanding of the composition of our solar system, as well as acquire more useful scientific data about celestial bodies and protoplanetary disk formation. During its journey to the far side of the Moon, this dust counter will provide scientific information on the dust that strikes the solar sail.

To achieve this mission, the instrument is composed of thin sensors mounted on the external part of the sailcraft and an electronics box able to analyze the data and determinate the characteristics of these particles. The sailcraft will be entirely designed and built by a team of students with the help of professional space experts and will be operated by an official Payankeu ground station. The dust counter will represent a real opportunity for future space engineers and physicists to demonstrate their abilities to help answer scientific questions.