EPSC Abstracts
Vol. 14, EPSC2020-1109, 2020
https://doi.org/10.5194/epsc2020-1109
Europlanet Science Congress 2020

Space simulator of the near-Sun environment

Georgios Tsirvoulis[1] and Mikael Granvik[1,2]
[1]Luleå Tekniska Universitet, Sweden
[2]Department of Physics, University of Helsinki, Finland

The study of Near Earth Objects has gathered significant scientific interest over the past few decades. Although the primary drive for this research is the need to discover and quantify potential threats to Earth, we have also gained substantial information about the formation and evolution of the Solar System, regarding both dynamical and physical processes.
One such process, by which asteroids that approach very close to the Sun are disintegrated, has been proposed by the most recent population models of NEOs to match the observational data. Our aim is to understand these physical processes therefore we are building an experimental apparatus which will enable us to simulate the extreme conditions of the Solar neighborhood.
The experimental setup will consist of a vacuum chamber, wherein asteroid simulant samples will be placed. To simulate the Solar radiation we will make use of a high power Xenon lamp able to deliver a beam of about 50 W/cm2 of maximum power on the sample. To expand the parameter space we will use a periodic shutter to emulate the rotation of the asteroid, and a power attenuator to probe different heliocentric distances. The process will be monitored by regular and high-speed cameras in order to record and study the production and velocities of ejecta. Thermocouples will also be used to log the temperature changes of the samples, and a mass spectrometer fitted on the chamber will enable us to determine the composition of the reaction products.
Apart from our main goal, which is to study the disruption of NEOs close to the Sun, we believe that the capabilities of our experimental setup extend beyond that. We believe it could offer an opportunity for a number of different experiments, such as tests of spacecraft composites or alloys, and we welcome collaborations to work on new ideas.