

Space debris and solar system bodies research at Comenius University Bratislava

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Research and scientific scope of the Division of Astronomy and Astrophysics, which belongs to the Department of Astronomy, Physics of the Earth and Meteorology, is focused on the interplanetary mass, physics and dynamics of small bodies of the Solar system, their relations and evolution and on modeling of the orbital evolution of the dust particles. Research also focuses on space debris and investigation of their dynamical, physical and reflectance characteristics. Here the emphasis is put on the application of the research in context of space safety activities. Additionally, quite extensive research is also dedicated to galactic astrophysics.

In our work we will present all the research programs conducted at our institute with extensive focus on space debris research. Space debris is becoming an issue for ground-based observations as well it pollutes the night background sky and contributes to its as a light pollution. We will present the data reduction of light curves extracted from the publicly available photometric catalogues. We will report estimated physical parameters such beta (diffuse vs specular reflection) and mean cross section multiplied by geometric albedo for more than 600 rotating objects including upper stages, non-functional spacecraft, and debris fragments for which we constructed the phase functions.

In recent years, the space debris population, as well as the space traffic, rapidly increased. This leads to a dramatic surge of artificial objects re-entering the atmosphere creating meteor-like effects. These effects can be detected by nominal meteor detection systems such as the All-sky Meteor Orbit System (AMOS) operated by Comenius University in Bratislava, Slovakia. We will discuss the example case of CZ-3B R/B re-entry event captured by the AMOS systems on the Haleakalā and Maunakea Observatories in Hawaii on October 24th 22:01 HST (October 25th 08:01:37 UTC). Preliminary results of the data reduction for the detected fragments will be presented.

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