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Moon Exploration – Part 3 (2C)

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A REGOLITH CLOSE-UP IMAGER ON-BOARD THE EMIRATES LUNAR MISSION'S RASHID
ROVER**Abstract**

The Emirates Lunar Mission's consists of the Rashid rover, a small, mobile robot in the 10kg class. As part of its scientific payload, Rashid will also carry an optical microscope (CAM-M) which aims to investigate the lunar surface at the 10s of micron scale. The lunar sample return missions from almost half a century ago, brought back a wealth of material from the Moon which allows to study the microscopic properties of these samples in great detail. However, the surface layering and distribution of the regolith in its undisturbed environment has not been addressed up to now, due to the intrusive nature of sample taking. In particular the top layer regolith properties are of great interest, since it is this layer which is most exposed to space weathering processes. In addition, it is the uppermost surface grain population which is emitting photo-electrons, due to the incoming radiation, and will thus become electrostatically charged. This process is considered the main driver for dust levitation and transportation across the lunar surface. A detailed imaging survey of the surface grain properties is therefore of great interest in view of understanding their geological properties, as well as the different physical processes involved in the transportation of dust. To address this topic, the concept of a compact close-up imaging device (CAM-M), being able to resolve the majority of the lunar particle size distribution, is presented. This instrument is designed to be mounted on-board a lunar rover, which will allow to sample the undisturbed lunar surface layer at numerous locations. In this paper the instrument design, expected performances, and current

operation concepts are presented. Synergies with other potential instruments on-board Rashid are also discussed.