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Telescopic Ground Observations for Lunar Impact Flash Detection using the SPOSH camera

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Abstract

We present first results from our observations carried out on the 28^{th} of March for the detection of impact flashes on the lunar surface. The moon was monitored for 2 hours and more than 2000 images were acquired. The observations verified the ability of our observing system to image the dark side of the Moon for impact flashes benefitting from the high sensitivity of our camera.

1 Introduction

While meteors, produced from meteoroids entering Earth's atmosphere, are a traditionally well-known optical phenomenon to astronomers, visual observations of impacts of meteoroids on the Moon became technically possible only recently. Due to the absence of an atmosphere, meteoroids encounter the Lunar surface at high velocity (up to 70 km/s), radiating short (<10 ms) light pulses on impact. The first confirmed meteoroid impact flash observed from Earth occurred during the Leonid storm in 1999 [1, 2]. Presently, several telescopic networks dedicated for lunar impact flashes observations run autonomously, weather conditions, Lunar position and phase permitting. Studying the flashes which are generated by such an impact can help improve our understanding of the meteor population near Earth as well as the physics of hypervelocity impacts.

2 Observational Technique

For our observations we used a Celestron 25.4cm f/10 Schmidt-Cassegrain telescope and the camera head of the SPOSH camera system [3] which was attached to it. The focal length of the telescope is 2023mm and the CCD array is 1024x1024 pixels large resulting into a square field of view of 38 arc minutes which can cover the entire dark side part of the Moon. The sensor communicates with a dedicated digital processing unit (DPU) via ethernet cable which digitizes the video data and produces 16 bit fits format images. The integration time used for the images was 1 second.

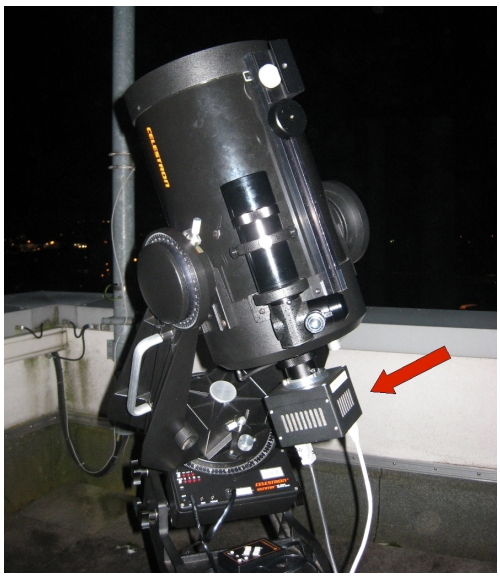

Figure 1: The SPOSH camera head mounted onto the telescope (red arrow)

3 Results

Most of the images obtained during our test observations are affected by motion blur due to the strong wind present at that time. Furthermore, strong reflections by the Moon can be seen in a few images. However, features of the lunar surface illuminated by earthshine can be clearly seen in a number of images (Fig. 2). Furthermore, faint stars up to +9 magnitude were identified in the images.

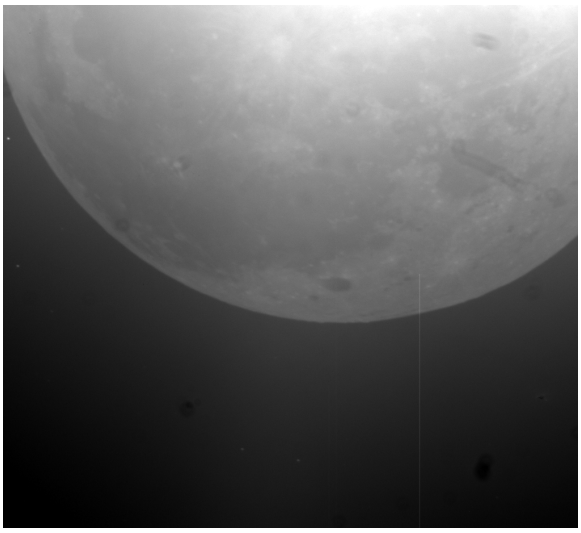

Figure 2: Dark side of the Moon illuminated by earthshine captured by SPOSH on the Celestron telescope

4 Summary

During our first Lunar observations we tested the functionality of the SPOSH camera head being attached to a mid-size telescope. Improvements of the existing system in order to mitigate the effects caused by the illuminated portion of the Moon can result into a capable instrument in terms of high camera sensitivity and Moon coverage, essential for Lunar impact flash detection. We plan to continue our Lunar observations by participating in coordinated observing campaigns with collaborating institutes in Europe.

References

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