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Impact cratering: hypervelocity experiments in support of planetary space missions

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This work is directly relevant to impact cratering for a better understanding of the collisional and surface evolution of the small bodies of the Solar System and to support the interpretation of the remote sensing observations from planetary space missions. Recently, two space missions ended and achieved their scientific objectives by impacting on their targets: Deep Impact on Comet Tempel 1 [A'Hearn *et al.* 2005] and Smart-1 on the Moon. Both the events could be observable from ground and coordinated international observational campaigns have been enforced in order to detect and record the flash of light produced during the impact.

The flash generated by a hypervelocity impact is due to the thermal emission from the hot plasma plume created by vaporized projectile and target material. Very little experimental work on impact flash measurements has been published (e.g. Eichhorn, 1976) and there clearly is a lack of data to precisely make a prediction of the brightness of the flash. As a sideline, few observations of meteoroids impacts on the Moon have been performed and interpreted (e.g. Ortiz *et al.* 2000, Bellot Rubio *et al.* 2000, Yanagisawa *et al.* 2006).

Therefore we performed experiments in order to optically record the light flash generated by the impact as function of kinetic energy changing the mass and velocity of the projectiles. Crater size and mass are determined and eject fragment collected in order to estimate also the energy used for the fracturing process and thus further constraining the partition of the energy. The results of these experiments were mainly aimed to better predict the brightness of the expected impact flash, but are also supporting the

interpretation of the observational data of the impact events, by comparing the measurements with the observations (e.g. Kuppers *et al*. 2005) , thus better constraining the current understanding of impact processes.

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