

How impact flashes differ between rocky impactors and icy impactors

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Impacts at velocities of several km/s generate luminous flashes. We conducted the laboratory impact experiments to study the characteristics of the impact flashes as follows;

- (1) impact velocity: 7km/s,
- (2) projectile: nylon 66 sphere (7mm in diameter),
- (3) target: nylon 66 block (8cm x 8cm x 4cm),
- (4) impact angle: normal impact,
- (5) instruments: photo diodes and an ultra-high speed camera (nac ULTRA Neo).

The photo diode signals for each shot show an optical pulse, the duration of which is equal to the [projectile diameter/impact velocity]. The camera images corresponding to the pulses show glowing projectiles and the target surface near the impact point (see the figure for example, shot1545). The 8 frames from left to right and top to down of the figure are obtained every 50ns (the exposure time is also 50ns). The radiation from the high temperature and the high pressure region due to the shock compression is observed through the translucent nylon projectile and target. The existence or no existence of the optical pulse may be used in the observations of the planetary impact flashes to discriminate the icy meteoroids (translucent) from the rocky meteoroids (opaque).

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