Dust impact detections by a set of Faraday cups in the lunar environments

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The Bright Monitor of the Solar Wind (BMSW) for the Luna-Resurs-1 mission is an instrument designed for high-time (30 ms) resolution measurements of moments of the ion energy distribution by Faraday cups in the solar wind and in a plasma environment at altitudes between 65 and 150 km above the lunar surface. Previous studies performed by a similar instrument located on-board the Spektr-R spacecraft demonstrated a possibility to detect hypervelocity impacts of dust grains by such instruments. Our analysis shows that the main problem of the reliable detection of dust impacts using such types of instruments is their sampling rate. In the paper, we present a novel design of a set of FCs that improves the ability of the dust detection using a simple identification algorithm that can store data with a higher sampling rate around the impact pulse. Moreover, we discuss a calibration of the detectors and their front-end electronics using the dust accelerator in order to find a relation between impact parameters and pulse heights.