

ACOUSTIC PENETRATION AND IMPACT DETECTOR FOR  
MICROMETEOROID AND SPACE DEBRIS APPLICATION

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ABSTRACT

An active detector is described which recently has been developed for laboratory impact measurements and which already has been proposed for cosmic dust flight experiments. The detector consists of a very thin penetration foil and an impact plate. By means of piezo detectors the elastic-wave propagation times between the impact location and the piezo detectors can be measured in the foil and in the target. The evaluation of these signals gives the time of the event, the impact location, the projectile velocity, the flight path direction and at least the order of magnitude of mass of the impacting particle. This type of sensor will meet all requirements for particle detection in the diameter range from a few microns (dust particles) up to approx. a few millimeters (space debris) at all velocities. Small-sized projectiles can be detected by sensitive amplifiers. Low-energy electronics including data storage can be used for triangulation and impact time calculation. First experimental results which have been achieved in the Munich Accelerator Facilities will be presented.

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