Calibration Experiments of Impact Ionization Dust Detector: Dependence of Impact Position and Particle Chemical Composition

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We have developed a light-weight impact ionization dust detector, which we call IID, with a large sensor area. IID is a candidate for the payload of next Japanese lunar mission orbiter SELENE2 as Lunar Dust Monitor (LDM) [1]. IID is a plane parallel type of detector that weighs lighter than the detectors with bowl shaped target like Galileo dust detector [2] with the same aperture and field of view. Therefore, IID can fulfill the following requirements, i.e. "effective dust measurement with large aperture" and "light weighted to minimize the cost" in future dust measurement in space.

We can obtain information on mass and impact velocity of dust particles by using the total charge and rise time of impact-generated plasma signals [3]. To calibrate IID we impacted hypervelocity micro particles on IID by using Van de Graaff accelerators at The University of Tokyo and Max Planck Institute for Nuclear Physics. It was found from the past calibration tests that if impact velocity is evaluated properly, particle mass can be estimated within about one order of magnitude of an error regardless of impact position and particle chemical compositions.

In this presentation we will discuss the mechanism of signal production on IID and the optimal configuration of the impact ionization type of dust detectors.

Keywords: cosmic dust; in-situ detector; impact ionization.

References

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