Development of an impact-ionization dust detector on board spacecrafts: Necessary condition on applied voltage

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We are developing a light-weight and large-aperture dust detector in order to measure mass and velocity of interplanetary dust particles. Through experiments by impacting hypervelocity microparticles, we discovered important conditions which an impact-ionization dust detector must satisfy: the lowest voltage that must be applied to the target and the grid at a given distance. The relationship between this threshold potential and the distance between the electrodes has not been researched thoroughly, and this result is expected to be referred to in the development process of impact-ionization dust detectors in the future.