

DUST ASTRONOMY WITH DUST TELESCOPES

E. Grün

Max-Planck-Institut für Kernphysik, Heidelberg, Germany

Dust particles, like photons, are born at a remote site in space and time, and carry from there information that may not be accessible to direct investigation. From knowledge of the dust particles' birthplace and the particle bulk properties, we can learn about the remote environment out of which the particle was formed. The dust particles' trajectories (including the particles' origins) are determined via an in-situ detector with a narrow aperture plus measurements of the electric charge signals that are induced when the grains fly through an appropriately configured grid system. Modern in-situ dust detectors are capable of providing mass, speed, physical and chemical information for dust grains in space. A "dust telescope" can therefore be considered as a combination of detectors for dust particle trajectories along with a physical and chemical analysis of the dust particles. Interesting targets for a dust telescope are interstellar dust phenomena (e.g. the local interstellar

medium or circumstellar dust stars such as beta Pic), interplanetary dust phenomena (e.g. meteor stream dust, cometary, asteroidal, or lunar dust), or even space debris (e.g. fine grains from solid rocket burns). A state-of-the-art dust telescope would consist of an array of parallel-mounted dust instruments, which share a common impact plane of at least one square meter in size. Important components for the telescope would be a high-resolution impact mass spectrometer, a dust analyzer for the determination of physical and chemical dust properties, and large-area impact detectors with which to perform a trajectory analysis. Future developments of dust telescopes will be discussed.