

The Physics of Protoplanetary Dust Agglomerates: Erosion by the Impact of Micron Sized Grains

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Collisions between micron-sized grains and large agglomerates with relative velocities up to several 10m/s are believed to be an important physical processes in protoplanetary nebulae. We present experimental results on the erosion of macroscopic agglomerates consisting of micron-sized spherical particles via the impact of micron sized particles. The experiments cover a velocity range from 15m/s to 60m/s. We find that after an initial phase, in which an impacting particle erodes up to 10 particles of an agglomerate, the impacting particles compact the agglomerates surface and cause a valley hill structure on their surface, which passivates the agglomerates against the erosion. Due to this effect the erosion halts within our error bars for impact velocities up to 30m/s. For larger velocities the erosion is reduced by an order of magnitude. The influence of charging of the impactors and the target is discussed.