

The formation of planetesimals – the view from the laboratory-astrophysics perspective

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Laboratory experiments on the physical behavior of dust particles and aggregates thereof have changed our view of the formation of planetesimals, the hypothesized precursors of the planets. The classical picture of the formation of km-sized bodies in protoplanetary disks is by sticking collisions of the initially μm -sized dust grains. However, laboratory experiments have challenged this view over the last years by the observation that for the anticipated dust-aggregate sizes and collision velocities, mutual impacts do not always result in sticking, but often in bouncing or even fragmentation of the dust aggregates. For a minimum-mass solar nebula model, the bouncing and fragmentation barriers limit the expected maximum aggregate sizes to millimeters and centimeters/decimeters, respectively. In my talk, I will review the relevant laboratory work and its implications on the growth of protoplanetary dust aggregates. I will also address recent developments to explain how the bouncing, fragmentation, and meter-size barriers can be overcome.