

Abstract Submitted  
for the DPP20 Meeting of  
The American Physical Society

**Do Dust Grains in a Dusty Plasma Collide with Each Other?**<sup>1</sup>

PAUL BELLAN, Caltech — Astrophysical models of micron size dust grains immersed in a weakly ionized gas typically assume that upon collision dust grains can stick together or fragment. Fragmentation has never been observed in lab dusty plasma experiments; sticking has sometimes been inferred but no movie capturing sticking exists. Because the neutral mean free path ( $l_{nn} \sim 0.5$  mm) exceeds the dust radius  $r_d$ , dust drag is given by the Epstein formula  $m_d du/dt = -u/\tau$  where  $\tau = 3m_d/4\pi\rho_g r_d^2 v_{Tg}$  and  $g$  refers to gas. It is found that the stopping distance  $u_0\tau$  is much less than the dust-dust mean free path  $l_{dd}$  for astrophysical parameters but may or may not be so for lab plasmas. Being charged, the grains mutually repel so they cannot diffuse towards each other after stopping as the repulsive electrostatic energy greatly exceeds the dust grain thermal kinetic energy. If two dust grains on a collision course stop before traveling a mean free path they will not be able to touch and stick together.

<sup>1</sup>Supported by NSF/DOE Partnership and by NASA

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Date submitted: 24 Jun 2020

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