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**Interplay of surface roughness and air pressure in splash suppression** ANDRZEJ LATKA, SIDNEY NAGEL, University of Chicago — Surface roughness has generally been found to increase the splashing of drops impacting on a solid surface [1]. However, we have recently found [2] that the effect of roughness is considerably more complex: it does promote the prompt splashing associated with rough surfaces, but also inhibits the splashing that occurs through the formation of a thin sheet. Consequently, as roughness is varied, the drop can splash through one or both of these mechanisms. Surprisingly, for sufficiently high viscosities there is a region where increasing roughness eliminates splashing entirely. We show that this result is robust and holds for a variety of liquids impinging on surfaces of different materials and geometries. The mechanism through which roughness causes splashing is intimately connected with the ambient gas. We find, as in the case of thin-sheet splashing [3], that the removal of the surrounding air suppresses prompt splashing. As the gas pressure decreases, fewer droplets are ejected until the drop completely ceases to splash. This threshold pressure increases with liquid viscosity and decreases with surface roughness and impact velocity. [1] K. Range, F. Feuillebois, *J. Colloid Interface Sci.* **203**, 16 (1998); [2] A. Strandburg-Peshkin, M. M. Driscoll, S. R. Nagel, *BAPS.* DFD.AH.7 (2009). [3] L. Xu, W. W. Zhang, S. R. Nagel, *Phys. Rev. Lett.* **94**, 184505 (2005); L. Xu, *Phys. Rev. E* **75**, 056316 (2007); M. M. Driscoll, C. S. Stevens, S. R. Nagel, *Phys. Rev. E* **82**, 036302 (2010).

Andrzej Latka
University of Chicago

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