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Swirls and splashes: air vortices created by drop impact IRMGARD BISCHOFBERGER, KELLY W. MAUSER, ANDRZEJ LATKA, SIDNEY R. NAGEL, University of Chicago — A drop impacting a solid surface with sufficient velocity will splash and emit many small droplets. While liquid and substrate properties are clearly important for determining the splashing threshold, it has been shown that removing the ambient air suppresses splashing completely [1]. However, the mechanism underlying how the surrounding gas affects splashing remains unknown. As has been recently shown, there is no air beneath the liquid that could cause the splash [2] – thus where does the air matter? We use modified Schlieren optics combined with high-speed video imaging to visualize the air vortices created by the rapid spreading of the drop after it hit the substrate. In the first moments after impact, these vortices remain bound to the spreading drop, creating a low-pressure zone that travels with the advancing lamella. At a later time, after the occurrence of the splash, the vortices detach from the drop. We discuss possible connections between the forces generated by the vortices on the liquid lamella and the initiation of a splash. [1] L. Xu, W. W. Zhang and S. R. Nagel, Phys. Rev. Lett. 94, 184505 (2005) [2] M. M. Driscoll and S. R. Nagel, Phys. Rev. Lett. 107, 154502 (2011)

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