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Drop impact on a solid surface at reduced air pressure KENNETH LANGLEY, KAUST, E.Q. LI, KAUST, University of Science and Technology of China, Y.S. TIAN, KAUST, P.D. HICKS, University of Aberdeen, S.T. THORODDSEN, KAUST — When a drop approaches a solid surface at atmospheric pressure, the lubrication pressure within the air forms a dimple in the bottom of the drop resulting in the entrainment of an air disc upon impact. Reducing the ambient air pressure below atmospheric has been shown to suppress splashing [1] and the compression of the intervening air could be significant on the air disc formation [2]; however, to date there have been no experimental studies showing how the entrainment of the air disc is affected by reducing the ambient pressure. Using ultra-high-speed interferometry, at up to 5 Mfps, we investigate droplet impacts onto dry solid surfaces in reduced ambient air pressures with particular interest in what happens as rarified gas effects become important, i.e. when the thickness of the air layer is of the same magnitude as the mean free path of the air molecules. Experimental data will be presented showing novel phenomena and comparisons will be drawn with theoretical models from the literature. [1] Xu, L., Zhang, W.W. and Nagel, S.R. "Drop splashing on a dry smooth surface." *Phys. Rev. Lett.* 94, 184505 (2005). [2] Mandre, S., Mani, M. and Brenner, M.P. "Precursors to splashing of liquid droplets on a solid surface." *Phys. Rev. Lett.* 102, 134502 (2009).

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