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Impact of droplet on superheated surfaces DETLEF LOHSE, HENDRIK J.J. STAAT, TUAN TRAN, University of Twente, ANDREA PROSPERETTI, University of Twente and Johns Hopkins University, CHAO SUN, University of Twente — At impact of a liquid droplet on a smooth surface heated way above the liquid's boiling point, the droplet spreads without any surface contact, floating on its own (Leidenfrost-type) vapor layer, and then bounces back. We show that the dimensionless maximum spreading factor Γ, defined by the ratio of the maximal spreading diameter and the droplet diameter, shows a universal scaling $\Gamma \sim We^{\gamma}$ with the Weber number We – regardless of surface temperature and of liquid properties – which is much steeper than that for the impact on non-heated (hydrophilic or hydrophobic) surfaces, for which $\gamma = 1/4$. Based on the idea that the vapor shooting out of the gap between the droplet and the superheated surface drags the liquid outwards, we derive scaling laws for the spreading factor Γ, the vapor layer thickness, and the vapor flow velocity.

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