Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Pool impacts of Leidenfrost drop BAPTISTE DARBOIS TEXIER, Grasp, ULg, Liege, Belgium, ELINE DEHANDSCHOEWERCKER, Ecole Polytechnique, France, ZHAO PAN, Splash lab, Brigham Young University, TODD TRUSCOTT, Spanish Lab, Utah State University, LAURENT MAQUET, STEPHANE DORBOLO, Grasp, University of Liege, Belgium — This work concerns the impact of a droplet made of a volatile liquid (typically HFE) on a pool of an other liquid (typically silicone oil) which temperature is above the boiling point of the drop. Depending on the properties of the two liquids and the impacting conditions, four different regimes are observed. For low impacting speeds, the droplet bounces on the surface of the bath and finally levitates above it in a Leidenfrost state. Such a regime occurs as soon as the pool temperature exceeds the boiling point of the drop. This observation means that there is no threshold in temperature for a Leidenfrost effect on a liquid surface contrary to the case of a solid substrate. For intermediate impacting velocities, the pinch-off of the surface of the pool entraps the drop in the liquid bulk. The entrapped drop is separated from the pool by a layer of its own vapour in a similar way of antibulles. For increasing impacting speeds, the vapour layer between the drop and the pool does not hold during the pinch-off event. The contact of the drop with the hot liquid provokes a sudden and intense evaporation. At very large impacting speeds, the drop rapidely contacts the pool, spreads and finally induces a hemi-spherical cavity. In the end, these four different regimes are summarized in a Froud-Weber diagram which boundaries are discussed.

Baptiste Darbois Texier
Grasp, Physics Department, ULg, Liege, Belgium

Date submitted: 03 Nov 2015 Electronic form version 1.4