Karlsruher Institut für Technologie

Fakultät für Physik

Gemeinsames Kolloquium des KIT und der Universität Heidelberg

Detlef Lohse, University of Twente

»Floating on Air«

Einführung: H. v. Löhneysen

Droplet impact on (superheated) surfaces

A drop impacting on a solid surface deforms before the liquid makes contact with the surface. We directly measure the time evolution of the air layer profile under the droplet using high-speed color interferometry, obtaining the air layer thickness before and during the wetting process. Based on the time evolution of the extracted profiles obtained at multiple times, we measure the velocity of air exiting from the gap between the liquid and the solid, and account for the wetting mechanism and bubble entrapment. The present work offers a tool to accurately measure the air layer profile and quantitatively study the impact dynamics at a short time scale before impact.

In case that the liquid droplet impacts on a smooth surface heated above the liquid's boiling point, the droplet either immediately boils when it contacts the surface (''contact boiling''), or without any surface contact forms a Leidenfrost vapor layer towards the hot surface and bounces back (''gentle film boiling''), or both forms the Leidenfrost layer and ejects tiny droplets upward (''spraying film boiling''). We experimentally determine conditions under which impact behaviors in each regime can be realized. We show that the dimensionless maximum spreading of impacting droplets on the heated surfaces in both gentle and spraying film boiling regimes shows a universal scaling with the Weber number, which is much steeper than for the impact on nonheated (hydrophilic or hydrophobic) surfaces.

Freitag, 12.07.2013, 17 Uhr c.t.,
Gaede-Hörsaal, Physik-Flachbau (Geb. 30.22).
Anschließend Stehempfang im Gastdozentenhaus „Heinrich Hertz“

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