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The Vibrating Vapor Layer Beneath a Leidenfrost Drop THOMAS CASWELL, JUSTIN BURTON, SIDNEY NAGEL, University of Chicago — The levitation of a liquid drop above a hot surface is known as the Leidenfrost effect. Due to strong evaporation, a vapor layer forms beneath the drop that both levitates and thermally insulates the liquid, resulting in extremely long drop life times. The geometry of this vapor layer has been characterized using high-speed laser-light interference imaging [1], which showed spatial oscillations of the interface. Here we report the evolution of these oscillations using an algorithm we developed for identifying the interference fringes. From these fringes we extract the relative height profile of the vapor layer. We track the time evolution of the spatial-fluctuations and measure the absolute change in the average height of the drop over a time scale of seconds. Large, transient, azimuthal deformations to the bottom of the drop are correlated with the rapid escape of vapor and a change in height above the surface. We also observe and characterize a range of metastable star-like oscillations in the shape.

[1] Burton et al., PRL 109, 074301 (2012).

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