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Looking Under a Leidenfrost Drop JUSTIN BURTON, AARON SHARPE, ROELAND VAN DER VEEN, ANDRES FRANCO, SIDNEY NAGEL, Univ. of Chicago — The Leidenfrost effect can be observed when small water drops move around effortlessly without sticking on a hot pan. The transition to a levitated state, where the drops rest on an insulating layer of vapor, occurs at the Leidenfrost temperature. Experiment [1] and theory [2] have examined the lifetime and maximum size of Leidenfrost drops. However, the liquid-vapor interface beneath the drop has not been fully charcterized. We report experiments using laser-light interference to measure the geometry of the liquid-vapor interface. By imaging the interference fringes produced between the bottom surface of the liquid and the hot substrate, we can measure the curvature of the vapor pocket beneath the drop as well as the azimuthal undulations along the neck that sits closest to the surface. From these measurements, we can extrapolate the shape of the bottom of the drop, which fluctuates in time with a period of a few milliseconds for millimeter-sized water drops. Our measurements of the azimuthal neck radius agree with predictions [2]: the difference between the drop and neck radii, $(R_d - R_n) \approx 0.53\lambda$ in the limit of large drops where λ is the capillary length of the fluid. For small drops we recover the result found in [1] that $R_n \propto R_d^2/\lambda$.

[1] A. Biance, C. Clanet, D. Quere, Phys. Fluids **15**, 1632 (2003).
[2] J. H. Snoeijer, P. Brunet, J. Eggers, Phys. Rev. E **79**, 036307 (2009).

Justin Burton
Univ. of Chicago

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