Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Impact, Spreading and Splashing of Superfluid Drops PETER TABOREK, MATTEW WALLACE, DAVID MALLIN, UC Irvine, ANDRES AGUIRRE, KENNETH LANGLEY, SIGURDUR THORODDSEN, KAUST — We investigate the impact of superfluid and normal liquid helium drops onto glass plates, in a custom-made optical cryostat, over a temperature range from 1.3 - 5 K. The unusual properties of liquid helium allow us to explore ranges of parameters that are difficult to obtain in conventional systems. Even in the normal state with T >2.17K, the viscosity and surface tension of liquid helium are unusually low, so it is easy to prepare drops with Re >30,000 and We >500. We track the spreading radius of the fluid rim, which initially grows as a power law in time with an exponent of ~ 0.5, while transitioning to Tanner's law at later times. In the superfluid state the rim velocity can exceed 4 m/s, which is significantly higher than the superfluid critical velocity. Here we see no splashing even at Re >100,000. Our experiments take place in an atmosphere of helium gas [1]. In conventional impact splashing the exterior air is incondensable, while our impacts in helium involve a condensable exterior phase, so the dynamics can be expected to be quite different. We study how these differences affect the splashing. [1] J.C. Burton, J.E. Rutledge, and P. Taborek, *Phys. Rev. E*, **75**, 036311 (2007).

Peter Taborek
UC Irvine

Date submitted: 01 Aug 2017 Electronic form version 1.4