

Abstract Submitted
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Super jets: the breakup of liquid jets in super- and normal-fluid helium-4 NATHAN SPEIRS, KENNETH LANGLEY, King Abdullah University of Science and Technology, PETER TABOREK, University of California Irvine, SIGURDUR THORODDSEN, King Abdullah University of Science and Technology — We experimentally examine the breakup of super and normal-fluid liquid helium-4 in an atmosphere of its own vapor as the temperature is varied from 1.2 K to the critical point. The jets evolve through five different breakup modes over the large range of Ohnesorge number, Reynolds number, and gas-liquid density ratio that we examine. As jets approach and pass through the critical point the liquid phase vanishes and we see a transition from liquid breakup to turbulent gaseous structures. This unique parameter space allows us to delve into the underlying physics of the various breakup modes and propose new quantitative transition criteria supported by dimensional analysis and a large three-dimensional data set.

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