Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Critical vortex shedding in a strongly interacting fermionic superfluid JEE WOO PARK, BUMSUK KO, YONG-IL SHIN, Seoul National University — Quantized vortices in superfluids are fundamental topological excitations whose creation and dynamics reveal the underlying thermodynamic and transport properties of the medium. Here, we report on the experimental study of the critical velocity for vortex shedding in a strongly interacting fermionic superfluid. The sample consists of a balanced mixture of two lowest hyperfine states of ^{6}Li atoms prepared in a highly oblate trap near a broad s-wave Feshbach resonance. By moving a repulsive optical obstacle through the condensate and directly imaging the vortices after time of flight, we measure the critical velocity for vortex shedding as a function of the interaction parameter $1/k_F a$ and the obstacle travel distance L. The critical velocity displays markedly different behaviors in the two limits of L. For short L, it shows a pronounced peak near unitarity, whereas for long L the peak is strongly suppressed, implying that the onset of drag force occurs at a lower velocity and that the increase of the drag force with velocity is slow near unitarity. Further comparison of the measured critical velocity to the speed of sound and the pair breaking velocity, and the application of the periodic shedding model to determine the onset of the drag force will be discussed.

Jee Woo Park
Seoul National University

Date submitted: 25 Jan 2018 Electronic form version 1.4