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Critical velocity for vortex shedding in a Fermi superfluid BUMSUK KO, JEE WOO PARK, YONG-IL SHIN, Seoul National University — The defining character of a superfluid is the existence of a critical velocity, below which a superfluid can flow through obstacles without dissipation. According to the Landau criterion, for a strongly interacting Fermi superfluid in the BEC-BCS crossover, the critical velocity is determined by the interplay between phonon and pair breaking excitations. Here, we explore the critical velocity for vortex dipole excitations in a strongly interacting Fermi superfluid of ^{6}Li. This is done by translating a repulsive optical obstacle through the condensate and directly imaging the vortices after time of flight. The critical velocity is examined for a range of interaction parameters $1/k_F a$ and obstacle travel distances L. In the two limits of L, we observe markedly different behaviors of the critical velocity: 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.

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