

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Fluid Flow and Depinning of a Metastable Vortex¹ RENA ZIEVE,
EMILY HEMINGWAY, INGRID NEUMANN, UC Davis — We observe a vortex
line pinned around a straight wire in superfluid helium, in the absence of external
rotation. Unperturbed, the vortex line remains pinned indefinitely, but we can
partially detach the vortex by heating the fluid in brief stints. Here we show that a
key property of the heating cycle is the maximum rate of change of the temperature,
which suggests that the fluid velocity generated by a temperature gradient plays an
important role in the depinning. Our measurements of how depinning depends on
both maximum temperature and velocity show a crossover from a velocity-dependent
depinning temperature at slow heating rates to a velocity-independent temperature
near 1.2 K for faster heating. We discuss how vortex loops generated by the thermal
fluid flow may be responsible for the depinning.

¹Supported by NSF, PHY-1263201

Rena Zieve
UC Davis

Date submitted: 15 Nov 2013

Electronic form version 1.4