Visualization of the Quantized Vortex Lattice Dynamics in $^4\text{He}$

KRISTINA GAFF, DANIEL LATHROP, University of Maryland, College Park — We study the lattice structure and dynamics of quantized vortices in superfluid helium using a new rotating experiment. This setup includes control of the entire apparatus from the rotating frame as well as implementation of a novel isolation cell, which permits investigation into new phenomena such as differential rotation in helium-II. Our documentation of the vortex lattice dynamics in the $(r, \varphi)$ plane (i.e. longitudinal to the vortices) includes real-time visualization of Tkachenko waves as well as evidence of differential rotation with distinct Stewartson layer boundaries. We also present possible Kelvin-Helmholtz instabilities and the formation and propagation of superfluid vortex bundles. We show that the angular velocity is a function of radius and may be driven by the geometry of the isolation cell.