Chiral textures in slabs of superfluid 3He-A

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We have used torsional oscillators, containing disk-shaped slabs of superfluid 3He-A, to probe the chiral orbital textures created by cooling into the superfluid state while continuously rotating. Comparing the observed flow-driven textural transitions with numerical simulations of possible textures shows that an oriented monodomain texture with $\hat{\mathbf{l}}$ *antiparallel* to the angular velocity $\mathbf{\Omega_0}$ is left behind after stopping rotation. The bias toward a particular chirality, while in the vortex state, is due to the inequivalence of energies of vortices of opposite circulation. When spun-up from rest, the critical velocity for vortex nucleation depends on the sense of rotation relative to that of $\hat{\mathbf{l}}$. A different type of vorticity, apparently linked to the slab's rim by a domain wall, appears when the angular velocity, $\mathbf{\Omega}$, is parallel to $\hat{\mathbf{l}}$.

[1] P. M. Walmsley and A. I. Golov, Phys. Rev. Lett. **109**, 215301 (2012).
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