

Vortex arrays in nanoscopic superfluid helium droplets

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We have studied the appearance of vortex arrays in a rotating He-4 nanodroplet at zero temperature within density functional theory. Our results are compared with those for classical rotating fluid drops used to analyze the shape and vorticity in recent experiments [L.F. Gomez et al., *Science* 345, 906 (2014)], where vortices have been directly seen in superfluid droplets for the first time. In agreement with the experiments, we find that the shape of the droplet changes from pseudo-spheroid, oblate-like for a small number of vortices to a peculiar "wheel-like" shape, delimited by nearly flat upper and lower surfaces, when the number of vortices is large. Also in agreement with the experiments, we find that the droplet remains stable well above the stability limit predicted by classical theories for axially-symmetric shapes.