

Universal description of massive vortices in superfluids

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The point vortex model in hydrodynamics is an effective theory for describing the motion of quantum vortices in superfluids. Regarding the vortex core as a cylinder immersed in the fluid, it behaves like a cylinder with circulation in a perfect fluid. This model has been traditionally used to describe vortex dynamics in superfluid ^4He , where the inertia of the effective cylinder or the vortex mass is neglected as the core size is typically much smaller than the characteristic length scales of the considered system. In contrast, in micro-scale superfluids of ultra-cold atoms, the vortex mass may affect vortex dynamics as was pointed out by several researchers. This work formulates the dynamics of massive point vortices in a unified manner applicable to different superfluid systems and reveals how this effect can be observably enhanced in a uniform superfluid.

References

Short bio (50 words) or link to website

<http://hiromitsu-takeuchi.appspot.com>

Relevant publications (optional)

Career stage

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