

Annihilation and Recurrence of Vortex-Antivortex Pairs in Two-Component Bose-Einstein Condensates

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In a two-dimensional Bose-Einstein condensate(BEC), vortex-antivortex pairs can annihilate, and this causes the decay of quantum turbulence. It is known that dissipation or a catalyst vortex is required for the annihilation of the pairs in one-component BEC [1].

We numerically confirmed in two-component BECs that the pairs could annihilate even without any dissipation or catalyst vortices when the intercomponent interaction is strong enough [2].

In addition, we also confirmed that the pair could be recreated alternately between two components under certain conditions, and we call this the recurrence. Then, the symmetry between two components, which is broken, initially recovers through the recurrence.

References

- [1] A J Groszek, T P Simula, D M Paganin and K Helmerson, Phys. Rev. A **93**, 043614 (2016)
- [2] J Han and M Tsubota, Phys. Rev. A **103**, 053313 (2021)