学术报告

Ground, symmetric and central vortex states in rotating Bose-Einstein condensates

Hanquan Wang（王汉权教授）

Yunnan University of Finance and Economics（云南财经大学）

Time： 10:30-11:30, November 16(Monday), 2020

Venue： 腾讯会议 ID：475 2589 7237

Abstract: We study ground, symmetric and central vortex states, as well as their energy and chemical potential diagrams, in rotating Bose-Einstein condensates (BEC) analytically and numerically. We start from the three-dimensional (3D) Gross-Pitaevskii equation (GPE) with an angular momentum rotation term, scale it to obtain a four-parameter model, reduce it to a 2D GPE in the limiting regime of strong anisotropic confinement. We discuss the existence/nonexistence problem for ground states (depending on the angular velocity) and find that symmetric and central vortex states are independent of the angular rotational momentum. We perform numerical experiments computing these states using a continuous normalized gradient flow (CNGF) method with a backward Euler finite difference (BEFD) discretization. Ground, symmetric and central vortex states, as well as their energy configurations, are reported in 2D and 3D for a rotating BEC. Through our numerical study, we find various configurations with several vortices in both 2D and 3D structures, energy asymptotics in some limiting regimes and ratios between energies of different states in a strong repulsive interaction regime. Although this is an old topic, we will extend this talk to show that the presented method is quite general and can be used to deal with many other problems such as investigation of ground state of two-component BEC、spinor-1 BEC、spinor-2 BEC and many others.

欢迎大家参加！