
LIA BRONSARD, McMaster University, Hamilton, ON, Canada

Vortices for a rotating toroidal Bose–Einstein condensate

We construct local minimizers of the Gross–Pitaevskii energy, introduced to model Bose–Einstein condensates (BEC) in the Thomas–Fermi regime which are subject to a uniform rotation. Our sample domain is taken to be a solid torus of revolution in \mathbf{R}^3 with starshaped cross-section. We show that for angular speeds $\omega_\epsilon = O(|\ln \epsilon|)$ there exist local minimizers of the energy which exhibit vortices, for small enough values of the parameter ϵ . These vortices concentrate at one or several planar arcs (represented by integer multiplicity rectifiable currents) which minimize a line energy, obtained as a Γ -limit of the Gross–Pitaevskii functional. The location of these limiting vortex lines can be described under certain geometrical hypotheses on the cross-sections of the torus.

These are results obtained in collaboration with S. Alama and J. A. Montero.