Vortices and Spontaneous Symmetry Breaking in Rotating Bose Gases

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Abstract. We present a rigorous proof of the appearance of quantized vortices in dilute trapped Bose gases with repulsive two-body interactions subject to rotation, which was obtained recently in joint work with Elliott Lieb. Starting from the many-body Schrödinger equation, we show that the ground state of such gases is, in a suitable limit, well described by the nonlinear Gross–Pitaevskii equation. In the case of axially symmetric traps, our results show that the appearance of quantized vortices causes spontaneous symmetry breaking in the ground state.