

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Coreless vorticity in multicomponent Bose and Fermi superfluids

GIANLUIGI CATELANI, Yale University, EMIL YUZBASHYAN, Rutgers University — We consider quantized vortices in two-component Bose-Einstein condensates and three-component Fermi gases with attractive interactions. In these systems, the vortex core can be either empty (normal in the fermion case) or filled with another superfluid. We determine critical values of the parameters – chemical potentials, scattering lengths and, for Fermi gases, temperature – at which a phase transition between the two types of vortices occurs. Population imbalance can lead to superfluid core (coreless) vorticity in multicomponent superfluids which otherwise support only usual vortices. For multicomponent Fermi gases, we construct the phase diagram including regions of coreless vorticity. We extend our results to trapped bosons and fermions using an appropriate local approximation, which goes beyond the usual Thomas-Fermi approximation for trapped bosons.

Gianluigi Catelani
Yale University

Date submitted: 20 Nov 2009

Electronic form version 1.4