

Coherently coupled Bose gases

Alessio Recati

Physics Department, University of Trento

In the Colloquium the physics of coherently coupled two-component Bose gases at zero temperature is presented. The behavior of the system is rich and very different with respect to Bose-Bose mixtures.

At zero temperature and weak interaction the system can be described as a spinor Bose-Einstein condensate (BEC).

The ground state shows a second order ferromagnetic-like quantum phase transition. Due to a violated $U(1)$ symmetry the spectrum is gapless for the density channel and gapped for the spin-channel. The gap closes at the phase transition point.

The vortices can be very different from the usual one in single component BEC or mixtures.

The presence of spin-(in)dependent trapping potentials allows for interesting configurations where the neutral and polarized phases coexist.