Tata Institute of Fundamental Research
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Internal Seminar

The ground state properties of spin-1 Bose-Einstein condensate under harmonic confinement

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In a Bose-Einstein condensate (BEC), if the hyperfine spins of the constituent atoms are available degrees of freedom, it is referred to as a spinor BEC. In this talk, we focus on spin-1 BEC, where the constituent atoms have hyperfine spin-1. In the mean-field regime, the dynamics of the system are captured in the Gross-Pitaevskii (GP) equations, which is a set of three, coupled non-linear Schrodinger equations. In the absence of trapping (homogeneous), the ground state and the related phase diagram can be easily obtained from the solution of the GP equations. In a more realistic situation that happens in typical experiments, the condensate is trapped by some external confinement. For the harmonically trapped condensate, I will propose a variational method (VM) which avoids several limitations of the existing analytical methods. This allows us to get the phase diagram of a trapped condensate and draw a detailed comparison with its homogeneous counterpart.

Thursday, Feb 15th 2024

14:30 Hrs

Auditorium