

Seminar

Miscible - Immiscible Transition in the Strongly Interacting Bosonic Mixtures

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Interaction plays an important role in the mixing properties of a multi-component system. It is now well established that the miscibility - immiscibility transition (MIT) in a weakly interacting mixture of Bose gases is predominantly determined by the strengths of the intra and inter-component two-body contact interactions, range of which is usually restricted to individual sites of a lattice system. On the other hand, in the strongly interacting regime other interaction induced processes become relevant, which can influence properties of the system in addition to stabilising new quantum phases.

In this talk, I will present our recent results on the MIT in the strongly interacting phases of two-component bosonic mixture trapped in a homogeneous two-dimensional square optical lattice. Particularly, we investigate the transition when both the components are in superfluid, one-body staggered superfluid or super solid phases. Our study prevails that, similar to the contact interactions, the MIT can be steered by competing intra and inter-component density induced tunnellings and off-site interactions. To probe the MIT in the strongly interacting regime we study the extended version of the Bose-Hubbard model with the density induced tunnelling and nearest-neighbouring interaction terms, and focus in the regime where the hopping processes are considerably weaker than the onsite interaction.

Thursday, Mar 7th 2024

11:00 Hrs (Tea / Coffee 10:45 Hrs)

Auditorium, TIFR-H