

Two-component Bose-Einstein Condensates

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Abstract

This talk is about two-component Bose-Einstein condensate in a harmonic trap. The aim is to describe the shape and the spatial configuration of the ground state pairs. We will show links between our model and other mathematical problems : optimal partition problems and the Cahn-Hilliard model for phase transition. These links appear in our model in the limit when intercomponent particle interactions are large, so the two components segregate. In a first time, I will prove that in the case of weak intracomponent particle interactions, the two components segregate, while their supports approaches complementary half spaces. Then, I will address the case of strong intracomponent particle interactions. In this regime, I will show that the Gross-Pitaevskii energy of a two component condensate can be rewritten as a weighted Cahn-Hilliard energy, plus the energy of the ground state of a one component condensate. Finally, I will address the Γ -convergence of the weighted Cahn-Hilliard energy.