Double universality of a quantum phase transition in spinor condensates

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Abstract

We consider a phase transition from antiferromagnetic to phase separated ground state in a spin-1 Bose-Einstein condensate of ultracold atoms. We demonstrate the occurrence of two scaling laws, for the number of spin fluctuations just after the phase transition, and for the number of spin domains in the final, stable configuration. Only the first scaling can be explained by the standard Kibble-Zurek mechanism. We propose a simple dynamical model to explain the occurrence of two scaling laws, and demonstrate that the scenario of multiple Landau-Zener crossings allows to predict the number of defects in a wide range of parameters.