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Testing Kibble-Zurek mechanism in ion traps RAMIL NIGMATULLIN, Imperial College London, ADOLFO DEL CAMPO, T4 and Center for Nonlinear Studies, Los Alamos National Laboratory, GABRIELE DE CHIARA, Centre for Theoretical Atomic, Molecular and Optical Physics, Queen's University Belfast, GIOVANNA MORIGI, Theoretical Physics, University of Saarland, MARTIN PLENIO, Institute of Theoretical Physics, Ulm University, ALEX RETZKER, The Racah Institute of Physics, Hebrew University of Jerusalem — A quench through a critical point of a second order phase transition results in the formation of topological defects in the system. Kibble-Zurek (KZ) theory predicts the scaling of a number of defects as a function of quench rate. This scaling depends on the critical exponents of the phase transition, and hence the study of the defect density reveals something about the nature of phase transition itself. There are a number of proposals to test KZ theory experimentally. In this talk, we discuss the possibility of studying defect formation in ion traps. A linear ion chain confined in a Paul trap undergoes a continuous phase transition to a zigzag chain when the confining potential is lowered. If the chain is in a ring trap then the zigzag chain can be in a helical configuration with a nonzero winding number. Using molecular dynamics simulations we show that the scaling of the average winding number of the resulting helical chain is consistent with KZ theory.

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