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Nucleation and Dynamics of Topological Defects in Trapped Yb Ion-crystals SARA EJTEMAEE, PAUL C. HALJAN, Simon Fraser University — Topological defects, formed as a result of symmetry breaking in continuous phase transitions, have been observed in a range of physical systems. Included among these systems, laser cooled arrays of trapped ions, also known as ion crystals, are well suited to the study of nucleation and dynamics of defects since they are a highly controllable system in which defects can be imaged directly. In ion crystals, a rapid quench across the structural phase transition from linear to a two-dimensional zigzag configuration can lead to the formation of topological defects, which appear as "kinks" in the crystal structure. In this presentation, we report on defects created in a crystal of trapped ^{174}Yb ions, which is brought through the linear-to-zigzag phase transition by relaxing the transverse confinement. We measure the number of defects formed as a function of quench rate, and compare our results to simulations and theoretically predicted rates of nucleation. We also study the dynamics of the defects, including their lifetime in the ion crystal, their motion, and the occurrence of two different forms of defect, discrete and extended.

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