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Spontaneous nucleation of topological defects in trapped Yb^+ ion-crystals SARA EJTEMAEE, PAUL. C. HALJAN, Simon Fraser University — Laser-cooled arrays of trapped ions, also known as ion crystals, are currently being investigated for quantum information processing. They are also interesting as a mesoscopic "condensed-matter" system to study classical and quantum few-body phase transitions. Following a recent theoretical proposal, we are performing experiments to investigate the non-equilibrium dynamics of the linear-zigzag phase transition in a system of trapped $^{174}Yb^+$ ions. We use strong transverse confinement to align the trapped ions into a linear crystal. Gradually reducing the trap anisotropy induces a structural phase transition from linear to a two-dimensional zigzag configuration. Alternatively, rapidly quenching the anisotropy across the phase transition can lead to crystal structures containing spontaneously nucleated topological defects. We describe our recent experimental results on the formation and lifetime of these structural defects.

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