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Melting a crystal of self-propelled particles CHRISTOPHER OLSON, MICHAEL MULLER, LEE WALSH, NARAYANAN MENON, Univ. of Massachusetts Amherst — We experimentally study the kinetics of melting a two-dimensional non-cohesive crystal of hard, square-shaped millimeter-scale particles. Interactions between the square particles have four-fold rotational symmetry, but particles are designed with features such that when vibrated their predominant motion is polar along one body axis. We prepare the initial crystalline state with varying orientations of the particle polarity relative to the symmetry axes of the crystal. We then study the melting of this crystal when vertical vibrations are turned on. Orientational and translational order are initially strongly coupled, and during melting translational order is lost before orientational order. The spatial distribution of order parameters and the time scale for melting kinetics is strongly affected by compatibility between the polarity and the crystal axes in the initial condition.

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