

Abstract Submitted
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How many dissenters does it take to disorder a flock?¹ DAVID YLLANES, M. CRISTINA MARCHETTI, Syracuse University — Minimal models of active particles have had much success in the study of flocking behavior. Typically one considers a system of self-propelled particles with noisy aligning interactions. By varying the density of the system or the intensity of the noise one can switch between a disordered phase where the particles move randomly and independently and a flocking state where the velocities of the particles are aligned. In this work we consider what happens if a fraction p of the particles does not experience the aligning interaction. This is an interesting problem from a statistical mechanics point of view, with applications to collective behavior of living systems, where not all the members of a community (a flock of birds, a herd of sheep, etc.) behave in the same way. By carrying out extensive molecular dynamics simulations we show that even a very small fraction of such "individualistic" particles can have a dramatic effect on the whole system and, indeed, that the flocking can be destroyed for a very low value of p .

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