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Jammed Humans in High-Density Crowd Disasters ARIANNA BOTTINELLI, Uppsala Univeristy, DAVID SUMPTER, Uppsala University, JESSE SILVERBERG, Wyss Institute for Biologically Inspired Engineering, Harvard University — When people gather in large groups like those found at Black Friday sales events, pilgrimages, heavy metal concerts, and parades, crowd density often becomes exceptionally high. As a consequence, these events can produce tragic outcomes such as stampedes and "crowd crushes". While human collective motion has been studied with active particle simulations, the underlying mechanisms for emergent behavior are less well understood. Here, we use techniques developed to study jammed granular materials to analyze an active matter model inspired by large groups of people gathering at a point of common interest. In the model, a single behavioral rule combined with body-contact interactions are sufficient for the emergence of a self-confined steady state, where particles fluctuate around a stable position. Applying mode analysis to this system, we find evidence for Goldstone modes, soft spots, and stochastic resonance, which may be the preferential mechanisms for dangerous emergent collective motions in crowds.

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