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Mosh pits and Circle pits: Collective motion at heavy metal concerts MATTHEW BIERBAUM, JESSE L. SILVERBERG, JAMES P. SETHNA, ITAI COHEN, Cornell University — Heavy metal concerts present an extreme environment in which large crowds ($\sim 10^2 - 10^5$) of humans experience very loud music ($\sim$ 130dB) in sync with bright, flashing lights, often while intoxicated. In this setting, we find two types of collective motion: mosh pits, in which participants collide with each other randomly in a manner resembling an ideal gas, and circle pits, in which participants run collectively in a circle forming a vortex of people. We model these two collective behaviors using a flocking model and find qualitative and quantitative agreement with the behaviors found in videos of metal concerts. Futhermore, we find a phase diagram showing the transition from a mosh pit to a circle pit as well as a predicted third phase, lane formation.

Matthew Bierbaum
Cornell University

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