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Intrinsic fluctuations and driven response of insect swarms RUI NI, Yale University, JAMES G. PUCKETT, Gettysburg College, ERIC R. DUFRESNE, NICHOLAS T. OUELLETTE, Yale University — Much of our understanding of collective behaviour in social animals comes from passive observations of animal groups. To understand the group dynamics fully, however, we must also characterize the response of animal aggregations to disturbances. Using three-dimensional particle tracking, we study both the intrinsic fluctuations of laboratory swarms of the nonbiting midge Chironomus riparius and the response of the swarms to controlled external perturbations: the amplitude-modulated sound of male midge wingbeats. Although these perturbations have an insignificant effect on the behavior of individuals, we find that they can have a strong impact on the collective movement. Intriguingly, the response of the swarm is similar reminiscent to of that of a passive equilibrium system to an external driving force, with microscopic fluctuations underlying combining to produce a macroscopic linear response over a wide range of driving frequencies.

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