

Abstract Submitted
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Entropy measures of collective cell migration¹ ARIADNE WHITBY, Imperial College London & MRC Clinical Sciences Centre, SIMONA PARRINELLO, MRC Clinical Sciences Centre, ALDO FAISAL, Imperial College London — Collective cell migration is a critical process during tissue formation and repair. To this end there is a need to develop tools to quantitatively measure the dynamics of collective cell migration obtained from microscopy data. Drawing on statistical physics we use entropy of velocity fields derived from dense optic flow to quantitatively measure collective migration. Using peripheral nerve repair after injury as experimental system, we study how Schwann cells, guided by fibroblasts, migrate in cord-like structures across the cut, paving a highway for neurons. This process of emergence of organised behaviour is key for successful repair, yet the emergence of leader cells and transition from a random to ordered state is not understood. We find fibroblasts induce correlated directionality in migrating Schwann cells as measured by a decrease in the entropy of motion vector. We show our method is robust with respect to image resolution in time and space, giving a principled assessment of how various molecular mechanisms affect macroscopic features of collective cell migration. Finally, the generality of our method allows us to process both simulated cell movement and microscopic data, enabling principled fitting and comparison of *in silico* to *in vitro*.

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