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Quantifying and controlling collective motion in externally guided cells JOSHUA PARKER, CAN GUVEN, CHENLU WANG, EDWARD OTT, WOLFGANG LOSERT, Department of Physics, University of Maryland — Many motile cells use chemical signals to coordinate their motion to aid in performing a larger task, be it healing a wound or aggregating to form a spore. This coordination can vary from subtle variations in overall alignment to broad, visibly structured patterns. Of particular interest of study are two organisms We introduce a model for motion towards a chemical signal and study these spatio-temporal correlations in the context of autocrine relay, such as seen in *Dictyostelium discoideum*, where we demonstrate that adhesion and chemical degradation both enhance visible “streaming” structures. We also study a model of paracrine signal relay relevant to human neutrophil migration and demonstrate how temporally varying chemical signals can be used to coordinate cell migration. We discuss both of these results in the context of their relevance to the survival of the organism and highlight future experimental tests.

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