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Noise constricts the Hydrodynamic Horizon of Bacteria KNUT DRESCHER, JORN DUNKEL, DAMTP, University of Cambridge, LUIS CISNEROS, Department of Physics, University of Arizona, SUJOY GANGULY, RAYMOND E. GOLDSTEIN, DAMTP, University of Cambridge — Bacterial processes ranging from gene expression to motility and biofilm formation are constantly challenged by internal and external noise. While the importance of stochastic fluctuations has been appreciated for chemotaxis, fluid dynamics is currently believed to determine cell-cell scattering – the elementary event that leads to swarming and collective swimming in active suspensions. Here we present the first direct measurement of the bacterial flow field generated by individual Escherichia coli, and infer that Brownian noise and intrinsic variability of the swimming mechanism drown the effects of fluid dynamics. This implies that steric collisions are the dominant physical interactions between bacteria.

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