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Bacterial motility and chemotaxis in shear ROBERTO RUSCONI, JEFFREY S. GUASTO, KWANGMIN SON, ROMAN STOCKER, Massachusetts Institute of Technology — Bacteria often exhibit directed motility ("taxis") in response to gradients of dissolved resources, like nutrients or oxygen. While we have a detailed understanding of chemotaxis in quiescent environments, it has been largely overlooked how this behavior is affected by fluid flow, despite the ubiquity of flow in bacterial habitats. Here we present experiments on aerotaxis (attraction to dissolved oxygen) of *Bacillus subtilis* in controlled shear flows. Using novel microfluidic devices we expose bacterial suspensions to steady oxygen gradients, with independent control over shear rates. From single-cell trajectories and the spatial distribution of bacteria, we show that the cell rotation induced by shear reduces the aerotactic performance, demonstrating that hydrodynamic conditions affect bacterial fitness.

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