Abstract Submitted
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Run-to-tumble switching noise controls the residence time of E.coli bacteria at solid surfaces[1] GASPARD JUNOT, THIERRY DARNIGE, PMMH-ESPCI, Paris, France, HAROLD AURADOU, FAST-University Paris-Saclay, Orsay, France., JOCHEN ARLT, ANGELA DAWSON, WILSON POON, VINCENT MARTINEZ, School of Physics and Astronomy, The University of Edinburgh, Edinburgh, United Kingdom., ANKE LINDNER, ERIC CLEMENT, PMMH-ESPCI, Paris, France — Using a 3D Lagrangian tracking technique, we monitor wild-type E.coli bacteria undergoing a run and tumble exploration process at surfaces. We determine the distributions of incoming and escape angles as well as the sojourn times distribution which displays a very broad tail. By directly monitoring the flagella bundling/debundling process, we also determine the mean tumbling times at the surface and in the bulk. To reproduce quantitatively all our data, we extend a model previously developed to describe the free swimming statistics of motile wild-type E.coli [N. Figueroa-Morales et al., Physical Review X, 10, 021004, (2020)]. The model is based on the presence of an internal protein concentration fluctuation which is triggering the run to tumble switch. It leads to a behavioral variability characterized by memory in the run-time sequence and a broad distributions of run times. This results suggest that it would be timely to assess precisely the role of such inherent chemotactic noise in other macroscopic transport processes implying motile bacteria.

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