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E. coli chemotaxis and super-diffusion JURE DOBNIKAR, University of Cambridge, FRANZISKA MATTHÄUS, University Heidelberg, MARKO JAGODIC, University of Ljubljana — The bacteria E. coli actively propel by switching between clockwise and anti-clockwise rotation of the flagella attached to their cell membranes. This results in two modes of motion: tumbling and swimming. The switching between the two modes is coupled to the ligand sensing through the chemotactic signalling pathway inside the cell. We modelled the signalling pathway and performed numerical simulations of the chemotactic motion of a large number of E. coli bacteria under various external conditions. We have shown that under certain conditions the thermal noise in the level of receptor-bound CheR (an enzyme responsible for methylation of the receptor sites) leads to super-diffusive behaviour (Lévy walk) which is advantageous for the bacterial populations in environments with scarce food. Exerting external pressure we might observe evolution of the wild-type to the super-diffusive populations.

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