

Abstract Submitted
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Coordinated Switching of Bacterial Flagellar Motors in a Single E. Coli¹ BO HU, YUHAI TU, IBM Thomas J. Watson Research Center — The swimming of *Escherichia coli* is propelled by its multiple flagellar motors. Each motor spins either clockwise or counterclockwise, under the control of an intracellular regulator, CheY-P. A long standing question is whether these motors work independently or not. There can be two mechanisms (extrinsic and intrinsic) to coordinate the switching of bacterial motors. The extrinsic one arises from the fact that different motors in the same cell sense a common biochemical signal (CheY-P) which fluctuates near the motors' response threshold. An alternative, intrinsic mechanism is direct motor-motor coupling which makes synchronized switching energetically favorable. Here, we develop simple models for both mechanisms and uncover their different hallmarks. A quantitative comparison to the recent experiments suggest that the direct coupling mechanism may be accountable for the observed sharp correlation between motors in a single *E. coli*. Possible origins of this coupling are discussed.

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