Abstract Submitted
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Hydrodynamics of bacteriophages PANAYIOTA KATSAMBA, ERIC LAUGA, University of Cambridge — Bacteriophage viruses, one of the most abundant entities in our planet, lack the ability to move independently. Instead, they crowd fluid environments in anticipation of a random encounter with bacteria. Once they 'land' on their victim's surface, they eject their genetic material inside the host cell. A big fraction of phage species, however, first attach to the flagella of bacteria. Being immotile, these so-called flagellotropic phages still manage to reach the cell body for infection, and the process by which they move up the flagellum has intrigued the scientific community for over four decades. In 1973 Berg and Anderson proposed the nut-and-bolt mechanism in which, just like a nut being rotated moves along a bolt, the phage wraps itself around a flagellum possessing helical grooves (due to the helical rows of flagellin molecules) and exploits the rotation of the flagellum in order to passively travel along it. We provide here a first-principle theoretical model for this nut-and-bolt mechanism and show that it is able to predict experiment observations.

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