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Nature's Helical Propeller SAVERIO SPAGNOLIE, ERIC LAUGA, University of California, San Diego — Many microorganisms propel themselves through fluids by passing either planar waves (typically eukaryotes) or helical waves (typically prokaryotes) along a filamentous flagellum. Both from a biological and an engineering perspective, it is of great interest to understand the role of the waveform shape in determining an organism's locomotive kinematics, as well as its hydrodynamic efficiency. In this talk we consider the specific issue of locomotion optimization for bacterial swimming, and we investigate the agreement between experimentally measured biological data on the swimming of E. coli and Salmonella, and optimization results from accurate numerical computations of the viscous flow fields around rotating bacterial flagella.

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