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Interface-Controlled Motility of Photoactive Microalgae in Confinement TANYA OSTAPENKO, CHRISTIAN T. KREIS, OLIVER BAEUMCHEN, Max Planck Institute for Dynamics and Self-Organization (MPIDS), 37077 Goettingen, Germany — The natural habitats of many biological microorganisms include complex interfaces and varying environmental conditions. For flagellated microalgae swimming in an aqueous medium, we showed that the curvature of the compartment wall governs their motility in geometric confinement [1]. This curvature-guided motility results in long detention times towards the interface, which we determined from the analysis of individual cell trajectories. For puller-type microswimmers, the precise nature of their flagella-wall interactions are important. We discovered a way to control these interactions for photoactive microalgae by manipulating the adhesiveness of their flagella in light [2]. Here, we report on the swimming dynamics of single photoactive microalgae in two-dimensional microfluidic chambers under different light conditions. We find that their motility can be switched reversibly in confinement, which could be exploited for use in biological optical traps and wastewater decontamination. [1] T. Ostapenko, et al. (arXiv:1608.00363), [2] C. Kreis, et al. (in review, 2016).

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