Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Confinement of Single Microswimmers in Circular Microfluidic Chambers TANYA OSTAPENKO, THOMAS BOEDDEKER, CHRISTIAN KREIS, FABIAN SCHWARZENDAHL, MARCO G. MAZZA, OLIVER BAEUMCHEN, Max Planck Institute for Dynamics and Self-Organization (MPIDS), 37077 Goettingen, Germany — The characteristics of active fluids, such as suspensions of biological microswimmers, may not only originate from the mutual interactions between the constituents, but also from interactions with interfaces and confining walls. In fact, the natural habitats of many living organisms are complex geometric environments, rather than bulk situations. The influence of interfaces on the dynamics was recognized as an important factor, and there are differences in the way that pusher-type swimmers (e.g. *E. coli*) and puller-type swimmers (e.g. *C. reinhardtii*) behave close to flat interfaces. Using experiments and simulations, we report on the dynamics of single puller-type swimmers in 2D circular microfluidic chambers. We find that the radial probability distribution of trajectories displays a characteristic wall hugging effect, where swimmers remain trapped at a concave interface for decreasing chamber size. For trajectories in the vicinity of the concave wall, an alignment of the local swimming direction with the local wall tangent is observed. In contrast, the swimmers tend to scatter off convex interfaces with short interaction times. Based on geometric arguments involving the swimmer's persistence length, we explain this entrapment effect at concave interfaces.

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Date submitted: 05 Nov 2015 Electronic form version 1.4