Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Flow-controlled densification in E. Coli suspension[1] GASTÓN MIÑO, PMMH-ESPCI - University Pierre et Marie Curie, France, ERNESTO ALTSHULER, LENIN DEL RIO, CARLOS PEREZ-PENICHET, Dept of Physics, University de la Havana, Cuba, ANKE LINDNER, ANNIE ROUSSELET, ERIC CLEMENT, PMMH-ESPCI - University Pierre et Marie Curie, France — Bacterial suspensions are paradigmatic examples of "active matter." Each bacterium can be regarded as a self-propelled particle that interact hydrodynamic ally with other bacteria or the suspension boundaries. As we know, in confined environments such as micron size channels or porous systems, solid boundaries act as traps for the bacterial motion and modify drastically the macroscopic transport properties of the suspension [1]. In this presentation, we show a new phenomenon concerning E. Coli suspensions flowing through a funnel-like constrictions between two micro-fluidic channels. The applied flow induces a counter-intuitive symmetry breaking in the bacteria concentration which increases strongly past the funnel. The enhancement persists over large distances. The density dissymmetry increases linearly with the flow rate and disappears at larger flow values. The effect is reversible with the flow. We explain these observations by emerging anomalous dispersion properties due to bacterial swimming trajectories and interactions between the bacteria and the channel boundaries. This experiment opens the possibility to control the bacterial concentration in microfluidic channels by simply tuning the flow of the suspending fluid. [1] Mino et al. Phys.Rev.Lett. 106, 048102(2011).

[1]Supported by CNRS-UMR7636, PGDG foundation and SESAME-IdF

Gaston Mino
PMMH-ESPCI - University Pierre et Marie Curie, France

Date submitted: 29 Nov 2011 Electronic form version 1.4