Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Chiral micro-printed particles in viscous shear flow FRANCESCA TESSER, ESPCI Paris, ANDREAS ZTTL, TU Wien, JUSTINE LAURENT, OLIVIA DU ROURE, ANKE LINDNER, ESPCI Paris — Particles in the form of helices in viscous shear flows migrate across streamlines as a result of their chiral shape and the shear flow. This chirality-induced drift can be used to sort micro-helices and other chiral objects in microfluidic channels, and it is also known to produce the rheotactic behavior of *E. coli* bacteria. In this case, the drift in combination with viscous friction on the bacterial head induces a rheotactic torque, acting as a bias on the orientation of the cell. High resolution micro-printing techniques allow nowadays to fabricate micro-particles with a controlled shape and enable to perform experiments where the re-orientation dynamics can be observed under shear flow, providing new insight in this fluid-structure interaction problem. We print both left- and right-handed helices attached to a spherical body and follow them individually as they are passively transported in a microfluidic channel. The resulting dynamics is a modified Jeffery tumbling, in which we recognize the effect of the particle handedness on the stabilization of the particle orientation. Finally we show how this stabilization mechanism can be optimized, by varying the helix geometry.

Francesca Tesser
ESPCI Paris

Date submitted: 27 Jul 2019 Electronic form version 1.4