

Abstract Submitted
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Symmetry-breaking phase-transitions in highly concentrated semen FRANCK PLOURABOU, ADAMA CREPPY, OLIVIER PRAUD, XAVIER DRUART, SBASTIEN CAZIN, Université de Toulouse, INPT, UPS, IMFT Allés Camille Soula, F-31400 Toulouse, France, and CNRS, HUI YU, PIERRE DEGOND, Department of Mathematics, Imperial College London, London SW7 2AZ, United Kingdom — New experimental evidence of self-motion of a confined active suspension is presented. Depositing fresh semen sample in an annular shaped micro-fluidic chip leads to a spontaneous rotation motion of the fluid at sufficiently large sperm concentration. The rotation occurs unpredictably clockwise or counterclockwise and is robust and stable. Furthermore, for highly active and concentrated semen, richer dynamics can occur such as self-sustained or damped rotation oscillations. Experimental results obtained with systematic dilution provide a clear evidence of a phase transition toward collective motion associated with local alignment of spermatozoa akin to the Vicsek model. A macroscopic theory based on previously derived Self-Organized Hydrodynamics (SOH) models is adapted to this context and provides predictions consistent with the observed stationary motion.

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