

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Auto-phoretic nanorods driven up the wall by gravity QUENTIN BROSSEAU, New York University - Courant Institute, FLORENCIO BALBOA USABIAGA, Flatiron Institute, ENKELEIDA LUSHI, New Jersey Institute of Technology, YANG WU, New York University, LEIF RISTROPH, New York University - Courant Institute, MIKE WARD, New York University, MIKE SHELLEY, JUN ZHANG, New York University - Courant Institute — Gravitaxis is the directed upward motion of micro-organisms against gravity, and is observed for a few ciliated organisms like *Chlamydomonas*, *Euglenas* or *Paramecium*. Lacking a dedicated sensor, their gravitactic response relies on bottom-heaviness or shape anisotropy to induce a bias in their swimming direction. Here we study the gravitaxis of heavy self-electrophoretic Janus nanorods that move upwards on a steeply inclined substrate. Comparisons in experiments and simulations between homogeneous and bottom-heavy nanorods reveal two mechanisms contributing to the gravitactic response of the latter: a buoyancy torque and hydrodynamic interactions with the wall. We show that lubrication forces induce an effective fore-aft asymmetry on nanorods that reinforces the orientation bias to move up the steep wall against gravity.

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Date submitted: 01 Aug 2019

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