

Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Hindering particle sedimentation in the presence of swimming *E. coli*¹ BRYAN MALDONADO, QUENTIN BROSSEAU, PAULO ARRATIA, University of Pennsylvania — How passive particles sediment in the presence of microorganisms such as bacteria is a question that remains unanswered. To address this question, we experimentally investigate the effects of bacteria activity on the sedimentation process of dilute suspensions passive particles. Results show that the presence of swimming bacteria (*E. coli*) significantly reduces the speed of the sedimentation front of a dilute suspension of Brownian particles; in this dilute regime, but passive particles did not seem to affect the sedimentation speed of bacteria. We also find that bacteria increase the dispersion of the settling passive particles, measured by the width of the sedimentation front. Mean square displacement data shows that bacterial activity decays over long experimental (sedimentation) times. An advection-diffusion equation coupled to bacteria population dynamics seems to capture concentration profiles relatively well. A single parameter, the ratio of single particle speed to the bacteria flow speed can be used to predict front sedimentation speed.

¹NSF-DMR-1709763

Paulo Arratia
University of Pennsylvania

Date submitted: 10 Aug 2020

Electronic form version 1.4