

Abstract Submitted  
for the DFD13 Meeting of  
The American Physical Society

**Enhanced diffusion of tracers in a bath of self-propelled particles<sup>1</sup>**

ALEXANDER MOROZOV, University of Edinburgh — Recent experiments have shown that micron-size tracer particles in dilute suspensions of either swimming bacteria or synthetic self-propelled particles perform diffusive motion with the diffusion coefficient significantly larger than its thermal value. Several theories have been proposed to explain the origin and magnitude of the enhanced tracer diffusivity. There is now a general agreement that it is proportional to the so-called “active flux” - the product of the swimmer’s number density and their velocity. Here we present detailed theory and simulations of tracers diffusing in bacterial suspensions. Our work confirms the scaling with the active flux, but also unravels new important dependencies on the properties of the velocity field created by the swimmers and their kinematics. Our work is potentially relevant for understanding feeding currents and biomixing created by swimming microorganisms.

<sup>1</sup>Funded by the Engineering and Physical Sciences Research Council (EP/I004262/1).

Alexander Morozov  
University of Edinburgh

Date submitted: 02 Aug 2013

Electronic form version 1.4