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**Diffusion of an ellipsoid in a quasi-2D bacterial suspension** YI PENG, Department of Chemical Engineering and Materials Science, University of Minnesota, XINLIANG XU, Beijing Computational Science Research Center, China, LIPENG LAI, Singapore-MIT Alliance for Research and Technology, XIANG CHENG, Department of Chemical Engineering and Materials Science, University of Minnesota — Enhanced translational diffusion of tracer particles in a suspension of micro-swimmers has been established as a distinct feature of active fluids. Here, instead of spherical tracers, we study the diffusion of ellipsoidal particles of various aspect ratios in a free-standing film of E. coli. Using high-speed digital video microscopy, we measured the mean-square displacements and calculated the translational and rotational diffusion coefficients of elliptical tracer particles. We found that both the translational and rotational diffusion of the particles are dramatically enhanced by the motion of bacteria. At low concentrations, this enhanced diffusion arises from random scatterings of bacteria, whereas at high concentrations it is attributed to the collective swarming of bacteria. Through a detailed analysis of the coupling between translational and rotational diffusion and theoretical modeling, we explored the origin of enhanced diffusion in translational and rotational degrees of freedom.

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