Abstract Submitted
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The Force on a Boundary in Active Matter JOHN BRADY, WEN YAN, California Institute of Technology — We present a general theory for determining the force (and torque) exerted on a boundary (or body) in active matter. The theory extends the description of passive Brownian colloids to self-propelled active particles and applies for all ratios of the thermal energy $k_B T$ to the swimmer's activity $k_s T_s = \zeta U_0^2 \tau_R / 6$, where ζ is the Stokes drag coefficient, U_0 is the swim speed and τ_R is the reorientation time of the active particles. The theory has a natural microscopic length scale over which concentration and orientation distributions are confined near boundaries, but the microscopic length does not appear in the force. The swim pressure emerges naturally and dominates the behavior when the boundary size is large compared to the swimmer's run length $\ell = U_0 \tau_R$. The theory is used to predict the motion of bodies of all sizes immersed in active matter.

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