

Active Brownian Motion in Two Dimensions

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We study the dynamics of a single active Brownian particle (ABP) in a two dimensions. At late times, the particle undergoes boring ordinary diffusion. However, the signature of activity shows up at early or short times. At shoert times, the dynamics is highly anisotropic. We compute exactly the probability distribution at short times of the x and y component, as well as the distribution of the radial distance from the origin. These distributions are highly nnon-Gaussian and nontrivial. We then extend our studies to an ABP in a two-dimensional harmonic trap and show how non-equilibrium (non-Boltzmann) stationary distributions may emerge at late times.