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Turning Passive Brownian Motion Into Active Motion¹ FRANCISCO J SEVILLA, ALEJANDRO VSQUEZ-ARZOLA, ENRIQUE PUGA-CITAL, Instituto de Física, Universidad Nacional Autónoma de México — We consider out-of-equilibrium phenomena, specifically, the pattern of motion of active particles. These particles absorb energy from the environment and transform it into self-locomotion, generally, through complex mechanisms. Though the out-of-equilibrium nature of the motion of these systems is well recognized, is generally difficult to pinpoint how far from equilibrium these systems are. In this work we elucidate the out-of-equilibrium nature of non-interacting, trapped, active particles, whose pattern of motion is described by a run-and-tumble dynamics. We show that the stationary distributions of these run-and-tumble particles, moving under the effects of an external potential, is equivalent to the stationary distribution of non-interacting, passive Brownian particles moving in the same potential but in an inhomogeneous source of heat. The interest in this topic has recently regrown due to the experimental possibility to design man-made active particles that emulate the ones that exist in the biological realm.

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