

Exact symmetries in the velocity fluctuations of a hot Brownian swimmer

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Symmetries constrain dynamics. We test this fundamental physical principle, experimentally and by molecular dynamics simulations, for a hot Janus swimmer operating far from thermal equilibrium. Our results establish scalar and vectorial steady-state fluctuation theorems and a thermodynamic uncertainty relation that link the fluctuating particle current to its virtual entropy production at an effective temperature. A Markovian minimal model elucidates the underlying non-equilibrium physics.

Gianmaria Falasco, Richard Pfaller, Andreas P. Bregulla, Frank Cichos, and Klaus Kroy, Exact symmetries in the velocity fluctuations of a hot Brownian swimmer, Phys. Rev. E 94, 030602(R)

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