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Broken detailed balance observed for hydrodynamically coupled colloidal particles in two optical traps CHRISTOPH F. SCHMIDT, JANNES GLADROW, Universitt Gttingen, NIKTA FAKHRI, Massachusetts Institute of Technology, CHASE P. BROEDERSZ, Ludwig-Maximilians-Universitt Mnchen —
Optical traps can be approximated as harmonic potentials for refractile colloidal particles. If two particles are trapped by two optical traps at close distance, particles remain hydrodynamically coupled. With two traps at different laser powers, one can create a non-equilibrium situation, where one particle can feed energy to the other particle. We show that this situation leads to the breaking of detailed balance that can be visualized as finite flux in a coarse-grained phase space spanned by the displacements of the two particles. We test if the slight temperature difference caused by different laser powers drives the flux or if it is due to energy dissipation associated with scattered light, a second-order effect for non-absorbing particles.

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