Abstract Submitted
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Run length is the dimension that characterizes path integrals useful for designing passive bacterial pumps[1] DAVID LIAO, GUILLAUME LAMBERT, Department of Physics, Princeton University, Princeton, NJ 08544, PETER GALAJDA, Delft University of Technology, CJ Delft, The Netherlands, ROBERT AUSTIN, Department of Physics, Princeton University, Princeton, NJ 08544 — Asymmetric funnels have been used as passive pumps to concentrate *E. coli* in nanofabricated devices (Austin 2007). Funnel geometry changes pump efficiency, which could be important when driving cell sorters (Whitesides 2008). The large set of funnel geometries that could be considered when designing pumps motivated us to derive a path-integral-like formula to predict the flux produced by arbitrary funnel geometries. We applied this equation to a two-dimensional wedge-shaped funnel. Model and experiment agree that the steady-state ratio between concentrations on two sides of a funnel open to 60° is 3 when the aperture is one fifth the bacterial run length and 1 when the aperture is 16 times the run length, an example of how the run length here has a role loosely analogous to the wavelength in quantum mechanical path integrals.

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