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The isotropic random path: analysis, simulation, and a physical realization DON LEMONS, Bethel College, Kansas, TREVOR LIPSCOMBE, Johns Hopkins University Press, BLAKE JOHNSON, Bethel College, Kansas — We derive a set of stochastic differential equations, parameterized with a single diffusion constant, that describes an isotropic, one-dimensional random path embedded in three dimensions. These equations apply to several diverse systems: charged particles, photons, and polymers. The mean and variance of the squared distance between the ends of the path depend only upon the diffusion constant and the path length. We illustrate this dependence with numerical simulations and test it by gathering data on a physical realization consisting of segments of thread suspended in glycerol.

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