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Correlated random walks induced by dynamical wavefunction collapse[1] DANIEL BEDINGHAM, University of Oxford — Wavefunction collapse models modify Schrödinger's equation so that it describes the collapse of a superposition of macroscopically distinguishable states as a genuine physical process [PRA **42**, 78 (1990)]. This provides a basis for the resolution of the quantum measurement problem. An additional generic consequence of the collapse mechanism is that it causes particles to exhibit a tiny random diffusive motion. Furthermore, the diffusions of two sufficiently nearby particles are positively correlated — it is more likely that the particles diffuse in the same direction than would happen if they behaved independently [PRA **89**, 032713 (2014)]. The use of this effect is proposed as an experimental test of wave function collapse models in which pairs of nanoparticles are simultaneously released from nearby traps and allowed a brief period of free fall. The random displacements of the particles are then measured. The experiment must be carried out at sufficiently low temperature and pressure for the collapse effects to dominate over the ambient environmental noise. It is argued that these constraints can be satisfied by current technologies for a large class of viable wavefunction collapse models.

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