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Controlling Brownian motion of magnetic microspheres by magnetic wire traps A. CHEN, G. VIEIRA, T. HENIGHAN, A. HAUSER, F. YANG, C. JAYAPRAKASH, R. SOORYAKUMAR, Ohio State University — Microspheres with embedded superparamagnetic particles are being widely used in biomedical research to selectively influence biological entities. As most of these applications are in fluid-based suspensions, random Brownian movements of the microspheres have important consequences on their targeted behavior. We demonstrate a technique based on microscale ferromagnetic wires patterned on a silicon platform, where when the external field (H) augments the domain-wall field from the designed wires, the microspheres in the fluid can be tightly confined (trapped) within an area remote from the wires. Upon weakening the trap by tuning H, the amplitude or range of the Brownian motion steadily increases until an abrupt onset of large random fluctuations is reached. These results, which demonstrate control on the random walk of fluid-borne magnetic microspheres through non-contact forces, are well reproduced through simulations.

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