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Ballistic Brownian Motion of Supercavitating Nanoparticles DEZHAO HUANG, University of Notre Dame, JARROD SCHIFFBAUER, Colorado Mesa University, EUNGKYU LEE, TENGFEI LUO, University of Notre Dame — We show that the Brownian motion of a nanoparticle (NP) can reach ballistic limit when intensely heated to form a supercavitation. As the NP temperature increases, its Brownian motion displays a sharp transition from normal to ballistic diffusion upon the formation of a vapor bubble to encapsulate the NP. Intense heating allows the NP to instantaneously extend the bubble boundary via evaporation, so the NP moves in a low-friction gaseous environment. We find the dynamics of the supercavitating NP is largely determined by the near field effect, i.e., highly localized vapor phase property in the vicinity of the NP.

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