

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Direct measurement of ballistic to diffusive crossover in colloidal particles in simple and complex fluids¹ ANDREW HAMMOND, ERIC CORWIN, Univ of Oregon — Brownian motion was famously used by Einstein to demonstrate the molecular nature of fluids in 1905. Only recently has it become possible to examine the short time behavior of a single particle, albeit using an optical trap. The use of an optical trap to confine the particles allows an extremely high precision measurement of the short-time ballistic motion but at the cost of a loss of information about the crossover to diffusive behavior. We present a new measurement method which allows us to resolve the full transition between both ballistic motion and long-time diffusive motion. This technique is broadly applicable to many different types of liquids, from simple Newtonian fluids such as water to complex Maxwell fluids and beyond. Measuring the full transition provides a direct measurement of the temperature and rheological response of the fluid which control the shape of the transition. We comment on the usefulness of this measurement technique to study the glass transition.

¹National Science Foundation DMR-1255370, Simons Foundation No. 454939

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Date submitted: 10 Nov 2016

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