

Abstract Submitted  
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**Measuring the translational and rotational diffusion of colloidal clusters with digital holographic microscopy** JEROME FUNG, KRISTOPHER ERIC MARTIN, RYAN MCGORTY, DAVID M. KAZ, REBECCA W. PERRY, Harvard University, JOHN A. KELLER, Eastern Nazarene College, GUANGNAN MENG, VINOTHAN N. MANOHARAN, Harvard University — We measure the rotational and translational diffusion coefficients of individual non-spherical colloidal clusters undergoing three-dimensional Brownian motion. We image clusters comprised of spheres approximately  $1\ \mu\text{m}$  in diameter using digital holographic microscopy. Fitting the measured holograms to exact electromagnetic scattering calculations allows us to determine cluster positions and orientations with millisecond temporal resolution and  $\sim 10\ \text{nm}$  spatial resolution. For dimers of polystyrene spheres in an aqueous solution, our measurements of the coefficients for rotational diffusion as well as translational diffusion parallel and perpendicular to the dimer axis are consistent with theory. We discuss the extension of this work to non-axisymmetric trimers and potential applications.

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