Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Multidimensional optical fractionation with holographic verification KE XIAO, DAVID GRIER, Center for Soft Matter Research, New York University — Colloidal particles driven through a periodic potential energy landscape can become kinetically locked in to symmetry-selected directions. The path a given particle follows has been predicted to depend sensitively on such properties as the particle's size and refractive index. These predictions, however, have not been tested experimentally. We present experimental observations of colloidal silica spheres' trajectories through specially structured arrays of holographic optical traps, using quantitative methods of holographic video microscopy to track the particles' motions in three dimensions and simultaneously to measure their radii and refractive indexes with part-per-thousand resolution. Single-particle tracking and characterization enable us to demonstrate sorting of colloidal particles into spatially separated fractions with part-per-thousand resolution in either particle size or refractive index. Even more dramatically, these results agree quantitatively with previously untested predictions for the threshold of kinetically locked-in transport.

Ke Xiao
Center for Soft Matter Research, New York University

Date submitted: 17 Nov 2009 Electronic form version 1.4