Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

The Casimir effect in microfluidics ALEJANDRO RODRIGUEZ-WONG, ALEXANDER WOOLF, LULU LIU, DAVID WOOLF, Harvard School of Engineering and Applied Sciences, STEVEN JOHNSON, MIT Department of Mathematics, FEDERICO CAPASSO, Harvard School of Engineering and Applied Sciences, HARVARD SEAS COLLABORATION, MIT DEPARTMENT OF MATHEMATICS COLLABORATION — We describe predictions of unusual Casimir and light-induced interactions between bodies immersed in fluids, including tunable and highly temperature-dependent stable suspensions of compact microspheres. We exploit recently developed, sophisticated computational techniques for modeling Casimir interactions in arbitrary geometries to study fluid deformations in corrugated surfaces with features on the scale of the fluid-layer thickness, and quantify the contributions of non-additive electromagnetic effects in those geometries. Unlike previous calculations of wetting and dewetting effects based on the Lifshitz formula, our approach is fully general and allows studies of complex microfluidic environments with no uncontrolled approximations. Time permitting, we present preliminary experimental results.

Alejandro Rodriguez-Wong
Harvard School of Engineering and Applied Sciences

Date submitted: 09 Nov 2012 Electronic form version 1.4