Stability of Micro-particles Bound by Optical Forces

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Optical trapping refers to the spatial confinement of small particles by using light induced forces. It is an extremely useful tool in almost any area that involves small particle. When more than two particles are involved, their mutual scattering will modify the spatial intensity, and induce a coupling force called the optical binding force.

Optical binding, discovered in 1989, was a promising mechanism to produce large scale optically bound “matter”. However, up to date, this approach did not success. Some studies suggest that large optically-bound structure is intrinsically unstable due to the fact that optical forces are non-conservative.

Here, we shall show that instability is indeed linked to cluster size. The more particles, the more likely that such structure is unstable.