

Manipulating the Small things in Life: Optical Tweezers

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Optical tweezers use tightly focused beams of light to trap micron-sized dielectric objects. The tutorial aspects of this talk will explain the basis by which tweezers work and how one sets about their design. More recently, spatial light modulators, or computer generated holograms, have revolutionized tweezers, enabling many objects to be trapped simultaneously and manipulated. Trapping multiple objects allow us to create micron-sized 3-dimensional structures, examples of which include; simple cubes which can be rotated or scaled, complex crystal structures like the diamond lattice or interactive 3-dimensional control of trapped particles anywhere in the sample volume. Although primarily demonstrated using inert silica spheres, our technique is completely transferable to bio-materials allowing the assembly of 3-dimensional bio structures.