HOW OPTICAL TRAPPING WORKS

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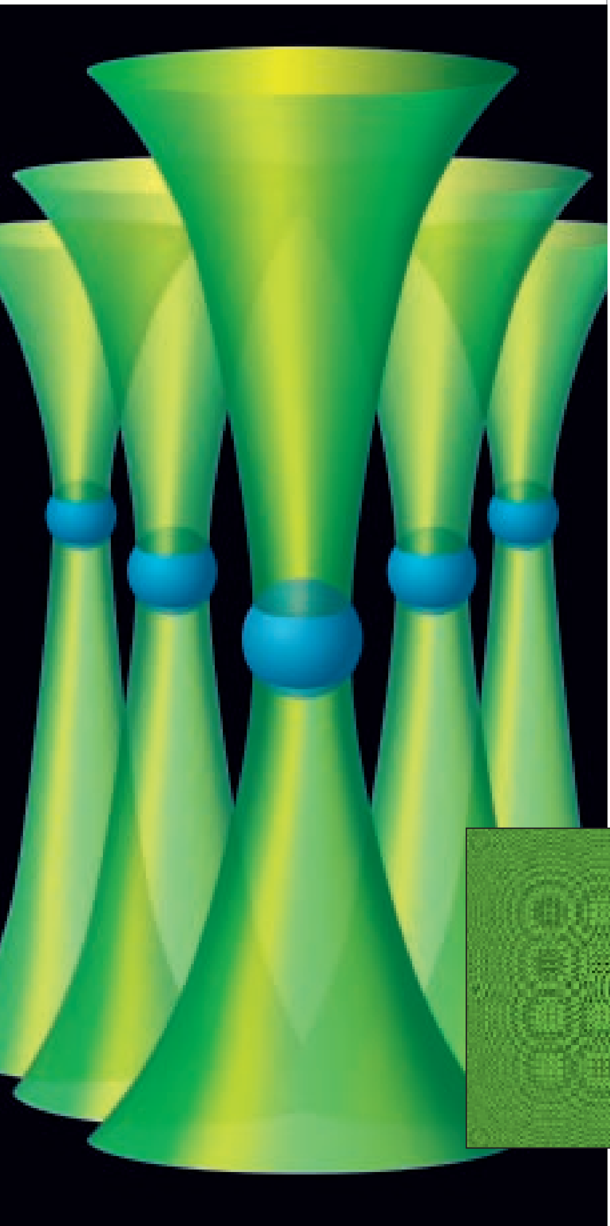
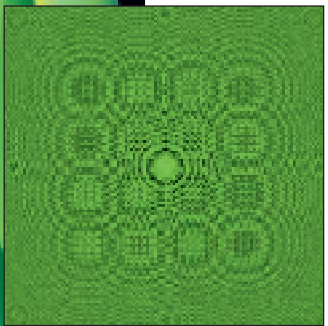
OPTICAL TRAPPING, WHICH IS ALSO REFERRED TO AS OPTICAL TWEEZERS, UTILIZES THE MOMENTUM TRANSFER ASSOCIATED WITH BENDING LIGHT THROUGH AN OBJECT. When light interacts with an object and undergoes any change in direction—due to reflection or refraction—the momentum of the light changes. Momentum is proportional to the energy of the light and, because Newton's 3rd law requires conservation of momentum, the object must undergo an equal and opposite momentum change. This change gives rise to a radiation force acting on the object. This radiation force can be broken down into a "scattering force" along the direction of light propagation and a "gradient force" due to the light intensity distribution around the object.

Typically, to create an optical trap a laser beam is focused to a small spot with a high numeric aperture (NA) microscope objective lens. Because the light intensity at the center is greater than that at the edges, the gradient force drives the object positioned within this focal point toward this central point. The scattering force, on the other hand, acts to push the particle out of the center, along the direction in which the light is traveling. If the gradient forces caused by refracted light are greater than the scattering forces caused by reflected light, the net effect will be a force which holds the particle in the center of the beam. In this case, a stable optical trap is formed.



HOW THE BIORYX 200 WORKS TO IMPROVE IT



INSTEAD OF A SINGLE FOCUSED LASER BEAM, THE BIORYX 200 USES A SPATIAL LIGHT MODULATOR TO CREATE HOLOGRAPHIC PATTERNS OF LIGHT
Holographic Optical Trapping (HOT) enables the user to sculpt the light from a single laser beam into as many as 200 independently controllable optical tweezers that can be positioned and moved in three dimensions.