Sonic lasso catches cells

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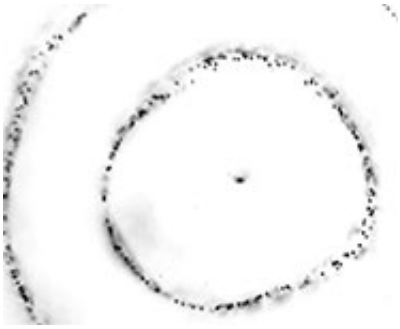

A photograph of particles trapped using a first-order Bessel function of the first kind. Credit: Bruce Drinkwater

(Phys.org) —Academics have demonstrated for the first time that a "sonic lasso" can be used to grip microscopic objects, such as cells, and move them about.

The research by academics at the University of Bristol's Department of Mechanical Engineering and the University of Dundee's Institute for Medical Science and Technology is published online in *Applied Physics Letters*.

The researchers have shown experimentally how tiny particles, such as cells, or any small objects can be trapped by a spinning ultrasonic, or sonic, vortex. The vortex acts as a lasso that can be controlled and moved, catching the microscopic particles and enabling their careful positioning.

This new technology makes possible applications such as assembly human tissue from a collection of cells and assembling nano materials.

Bruce Drinkwater, Professor of Ultrasonics in the Department of Mechanical Engineering and who led the study, said: "Our research has shown we can grip and move particles pretty much anywhere and along any path. The impressive thing is that it is completely non-contact, harmless and so ideal for moving delicate things, such as cells, around under a microscope. With further development this could be used to assemble human tissue as part of a tissue engineering production line."

The paper explains that acoustic vortices, known as Bessel-functions, can be used to trap and controllably position microparticles. Like a rope lasso, the waves carry linear and rotational momentum and so can cause the objects to spin as well as move. A circular device, made up of 16 ultrasound sources, generates and manipulates an acoustic field within a chamber, trapping microparticles and clusters of microparticles. Changes in the phase of the sinusoidal signals applied to the sources result in the movement of the Bessel-function pressure field and therefore the microparticles.

More information: Courtney, C. et al. Dexterous manipulation of microparticles using Bessel-function acoustic pressure fields, *Applied Physics Letters*, published online April 2013. dx.doi.org/10.1063/1.4798584

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