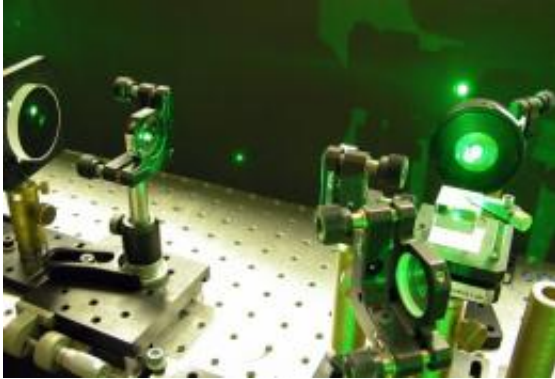


# Tractor beams come to life

September 8 2010, By Mike Lucibella, ISNS

---



The tractor beam in action suspends a small particle over an optics table. Credit: Courtesy of the Australian National University

Tractor beams, energy rays that can move objects, are a science fiction mainstay. But now they are becoming a reality -- at least for moving very tiny objects.

Researchers from the [Australian National University](http://www.anu.edu.au) have announced that they have built a device that can move small particles a meter and a half using only the power of light.

Physicists have been able to manipulate tiny particles over miniscule distances by using lasers for years. Optical tweezers that can move particles a few millimeters are common.

Andrei Rhode, a researcher involved with the project, said that existing

[optical tweezers](#) are able to move particles the size of a bacterium a few millimeters in a liquid. Their new technique can move objects one hundred times that size over a distance of a meter or more.

The device works by shining a hollow [laser beam](#) around tiny glass particles. The air surrounding the particle heats up, while the dark center of the beam stays cool. When the particle starts to drift out of the middle and into the bright laser beam, the force of heated air molecules bouncing around and hitting the particle's surface is enough to nudge it back to the center.

A small amount of light also seeps into the darker middle part of the beam, heating the air on one side of the particle and pushing it along the length of the laser beam. If another such laser is lined up on the opposite side of the beam, the speed and direction the particle moves can be easily manipulated by changing the brightness of the beams.

Rhode said that their technique could likely work over even longer distances than they tested.

- 
- PhysOrg.com [iPhone](#) / [iPad](#) Apps
  - [PhysOrg.com Audio Podcasts](#) / [iTunes](#)
  - PhysOrg.com [Android apps](#) (new version available)
  - [Join PhysOrg.com on Facebook!](#)
  - [Follow PhysOrg.com on Twitter!](#)
- 

"With the particles and the laser we use, I would guess up to 10 meters in air should not be a problem. The max distance we had was 1.5 meters, which was limited by the size of the optical table in the lab," Rhode said.

Because this technique needs heated gas to push the particles around, it can't work in the vacuum of outer space like the tractor beams in [Star](#)

[Trek](#). But on Earth there are many possible applications for the technology. The meter-long distances that the research team was able to move the particles could open up new avenues for [laser](#) tweezers in the transport of dangerous substances and microbes, and for sample taking and biomedical research.

"There is the possibility that one could use the hollow spheres as a means of chemical delivery agents, or microscopic containers of some kind, but some more work would need to be done here just to check what happens inside the spheres, in terms of sample heating," said David McGloin, a physicist at the University of Dundee in the U.K not connected with the Australian team.

Provided by Inside Science News Service

Citation: Tractor beams come to life (2010, September 8) retrieved 2 May 2024 from <https://phys.org/news/2010-09-tractor-life.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--