Atom-grabbing 'black hole' created

18:05 09 April 2010 by **Rachel Courtland**
For similar stories, visit the **Quantum World** Topic Guide

An artificial "black hole" designed to capture wayward atoms has been created. It paves the way for an atom trap that could yield previously unknown states of matter.

A team led by Lene Hau of Harvard University has mimicked the death spiral of matter falling into a cosmic black hole by applying a voltage across a carbon nanotube – a rolled-up sheet of carbon atoms. This created a powerful electric field that tugged at nearby rubidium atoms, which had been chilled to a fraction of a degree above absolute zero: a positive charge on the surface of the nanotubes attracts the rubidium atoms' electrons, while the positively charged nucleus is repelled.

This polarisation causes the atoms to spiral towards the nanotube, speeding them up until the atoms circle it in just a few trillionths of a second. Eventually each atom's outermost electron detaches and enters the nanotube through a process called quantum tunnelling. The positively charged rubidium ion that it leaves behind is repelled by the positively charged nanotube and slingshots away.

Modifications to this set-up could produce a trap capable of keeping a cloud of cold atoms spinning around the nanotube. "One could use the system to make completely new states of cold atom matter," says Hau. It could also be used to detect trace amounts of gas, or be adapted to make precise atom interferometers, which measure small variations in gravity, she says.

Journal reference: *Physical Review Letters*, DOI: 10.1103/PhysRevLett.104.133002

0
tweets
tweet
Like
PRINT
SEND
SHARE

If you would like **to reuse any content** from New Scientist, either in print or online, please **contact the syndication** department first for permission. New Scientist does not own rights to photos, but there are a variety of licensing options available for use of articles and graphics we own the copyright to.

Back to article

PRINT SEND SHARE

ADVERTISEMENT

NewScientist

Subscribe for Full Access to New Scientist

- 51 issues for $1.41 an issue ($72 in total)
- Complete online access to NewScientist.com

Select a country

Subscribe

ADVERTISEMENT

