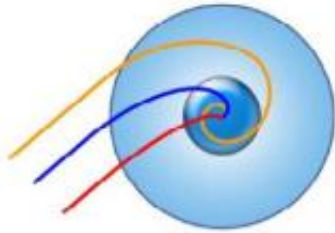


# Scientists create artificial mini 'black hole'

June 3 2010, by Lisa Zyga

---



(Left) A model of the electromagnetic omnidirectional absorber, in which electromagnetic waves hitting the cylinder bend spirally in the shell region, and become trapped and absorbed by the lossy core. (Right) A photograph of the device, which is composed of 60 concentric layers of copper-coated metamaterials. Image credit: Institute of Physics.

(PhysOrg.com) -- Scientists from China have built a device that can trap and absorb microwaves coming from all directions with a 99% absorption rate - a property that makes the device simulate, to some extent, an astrophysical black hole.

The scientists, who are from Southeast University in Nanjing, China, explain in their study published in the [New Journal of Physics](#) that this is the first experimental demonstration of an omnidirectional electromagnetic absorber in the microwave frequency region. To build the absorber, the researchers used the unique properties of [metamaterials](#) to manipulate light waves and achieve the wave trapping and absorbing properties.

The device itself is composed of a thin cylinder containing 60 concentric rings of copper-coated metamaterials arranged in layers. Each layer is imprinted with alternating patterns of resonant and non-resonant metamaterial structures. The design traps and absorbs [microwaves](#) coming from all directions by spiraling the radiation inward and converting its energy into heat. As with a black hole, [electromagnetic radiation](#) cannot escape from the device.

Although the electromagnetic absorber currently works only with microwaves, the researchers plan to develop a device that works with visible light. The device demonstrated here could have applications such as collecting microwaves and energies in free space, or as a source of thermal emission, since the device transfers electromagnetic energy into heat energy.

*You can now listen to all PhysOrg.com podcasts at [www.physorg.com/podcasts-news/](http://www.physorg.com/podcasts-news/)*

**More information:** Qiang Cheng, et al. “An omnidirectional electromagnetic absorber made of metamaterials” 2010 *New Journal of Physics* 12 063006. DOI:[10.1088/1367-2630/12/6/063006](https://doi.org/10.1088/1367-2630/12/6/063006).

© 2010 PhysOrg.com

Citation: Scientists create artificial mini 'black hole' (2010, June 3) retrieved 16 June 2024 from <https://phys.org/news/2010-06-scientists-artificial-mini-black-hole.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>
--