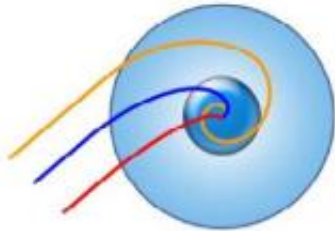


Scientists create artificial mini 'black hole'

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.

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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).

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