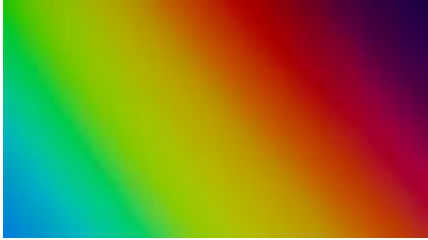


Beyond the looking glass...

August 13 2009



While the researchers can't promise delivery to a parallel universe or a school for wizards, books like Pullman's *Dark Materials* and JK Rowling's *Harry Potter* are steps closer to reality now that researchers in China have created the first tunable electromagnetic gateway.

The work, 'A simple route to a tunable electromagnetic gateway' is a further advance in the study of metamaterials, published today in the [New Journal of Physics](#).

In the research paper, the researchers from the Hong Kong University of Science and Technology and Fudan University in Shanghai describe the concept of a "a gateway that can block [electromagnetic waves](#) but that allows the passage of other entities" like a "'hidden portal' as mentioned in fictions."

The gateway, which is now much closer to reality, uses transformation optics and an amplified scattering effect from an arrangement of ferrite

materials called single-crystal yttrium-iron-garnet that force light and other forms of electromagnetic radiation in complicated directions to create a hidden portal.

Previous attempts at an electromagnetic gateway were hindered by their narrow bandwidth, only capturing a small range of visible light or other forms of electromagnetic radiation. This new configuration of metamaterials however can be manipulated to have optimum permittivity and permeability - able to insulate the electromagnetic field that encounters it with an appropriate magnetic reaction.

Because of the arrangement's response to magnetic fields it also has the added advantage of being tunable and can therefore be switched on and off remotely.

Dr Huanyang Chen from the Physics Department at Hong Kong University of Science and Technology has commented, "In the frequency range in which the metamaterial possesses a negative refraction index, people standing outside the gateway would see something like a mirror. Whether it can block all visible light depends on whether one can make a metamaterial that has a negative refractive index from 300 to 800 nanometres."

Metamaterials, the area of physics research behind the possible creation of a real Harry Potter-style invisibility cloak, are exotic composite materials constructed at the atomic (rather than the usual chemical) level to produce materials with properties beyond those which appear naturally.

More information: <http://stacks.iop.org/NJP/11/083012>

Source: Institute of Physics ([news](#) : [web](#))

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