

'Perfect' Invisibility Cloak Uses Metamaterials To Bend Light

The days when invisibility cloaks were confined to the world of "Harry Potter" may soon be over. Physicists at Duke University announced Monday that they had successfully cloaked an object with "perfect" invisibility.

Attempts at [creating an invisibility "cloak"](#) began in 2006, when David Smith (also a co-author of the new study) and colleagues developed theory of "transformation optics," BBC News reported. The theory centers on redirecting electromagnetic fields around an object, [rendering it invisible](#), ScienceNOW reported.

No effort had achieved "perfect" invisibility until Dr. Smith and graduate student Nathan Landy modified earlier cloak models with composite structures known as metamaterials. These materials can be designed to bend light and other electromagnetic radiation around them.

The older cloaks were a good start, but they always suffered from reflected light—[Landy explained to Phys.org that "it was much like reflections seen on clear glass. The viewer can see through the glass just fine, but at the same time the viewer is aware the glass is present due to light reflected from the surface of the glass."](#)

So how did they keep these reflections out of the new design?

["Landy's new microwave cloak is naturally divided into four quadrants, each of which have voids or blind spots at their intersections and corners with each other," explains io9.](#) "Thus, to avoid the reflectivity problem, Landy was able to correct for it by shifting each strip so that is met its mirror image at each interface."

Smith has said that he thought [a perfect cloak was unlikely](#). "I won't call it impossible, but it's implausible what you see in 'Harry Potter,'" he told Life's Little Mysteries in May. "That's perfect movie invisibility — too perfect."

But even if it doesn't mean we'll be able to sneak past hostile wizards any time soon, Smith acknowledges the importance of the new research: "This to our knowledge is the first cloak that really addresses getting the transformation exactly right to get you that perfect invisibility," he told BBC News.

In your notebook answer the following questions:

1. What are metamaterials designed to do?
2. Why might the military be particularly interested in this technology?
2. What are 3 possible disadvantages of invisibility according to the video?

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