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Turn invisible? Expert sheds light on matter

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Visiting don says an item becomes unseen if it 'tricks' light into curling around it

HARRY Potter's cloak of invisibility may have just inched closer to reality.

Scientists, including a visiting professor at the National University of Singapore (NUS), have come up with a new theory on bending light around objects.

Being able to bend light this way forms the basis of how cloaking devices work - and these could find military applications.

Ships and planes that can be hidden from radar, for example, have better odds against being shot down.

Physicist Ulf Leonhardt of Scotland's University of St Andrews, who is attached to NUS this semester,

says 'invisibility cloaks' can work if they trick a broad spectrum of visible light into thinking that space is curved.

In a curved space, the light will curl around the object instead of striking it. And if light is not reflected off an object, it is - simply - not seen.

'There's nothing mysterious going on,' said Professor Leonhardt, whose paper on the subject, written together with Czech researcher Tomas Tyc, has been published in this week's Science journal.

Existing prototypes of cloaking devices work imperfectly because they hide an object from only limited light frequencies, not a broad spectrum.

They are usually constructed of laboratory-made materials called metamaterials, which bend light in unnatural ways.

A simple water droplet, or glass, illustrates the bending of light; both make the light travelling through them perceive space as being curved, and refract light.

This is why a fish in a tank or a drinking straw in a glass of water looks smaller than it really is.

But manufacturing a type of material that can gently curve light and hide an object from view is harder than it sounds - and Prof Leonhardt admits he does not have the answer.

'I will hand this over to my experimental colleagues. All I can do is encourage them,' he quipped.

In August, Berkeley researcher Xiang Zhang produced two metamaterials - one with a net of metal layers, and the other with tiny silver wires - that refracted limited wavelengths of light.

But the materials produced came in tiny, nanoscale fragments, billionths of a metre in size - too small to cloak something as large as a battleship.

Nanotechnology researcher Venky Thirumalai Venkatesan, of NUS' physics and electrical and computer engineering departments, said Prof Leonhardt's theory states that it is possible to build a kind of material that can cloak objects from a broad spectrum of light frequencies.

'The issue is how to translate this into an experimental configuration,' he said.

In other words, the question is how to manufacture a practical, fail-safe invisibility cloak.

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