Physicists demonstrate a time cloaking device

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Physicists Moti Fridman and colleagues at Cornell University have successfully demonstrated a so-called time cloaking device that is able to "hide" time for 15 trillionths of a second. In a paper published on *arXiv*, the researchers describe how they were able to cause light passing through a fiber optic cable to compress, than decompress, causing a hole or void to exist, long enough for there to be a lag between the two.

Unlike other proven cloaking devices that work by bending light around objects, this cloaking device works by compressing the light passing through the optical cable by means of a special silicon lens that causes some of the light passing through it to speed up and some to slow down, which causes the waves to divide. Another lens, a little farther up the cable then causes the light to be put back together. The result is light emerging from the end of the cable that appears to be unaltered, which means, for the little bit of space between the lenses, things have or could have gone on, with no record of it occurring.

While it appears the new technology might be used for signal processing application, it appears equally likely it might be used for both good and bad purpose as well. For example, if coded messages could be hidden in a series of these cloaks, it would be mighty difficult to intercept them, making for very secure communications. On the other hand, it also seems logical to conclude that such a hidden time lag, if it could be made to pulse on and off, over and over as a data is passing through, could be used to intercept data without there being a record of it.

In the demonstration, the reason that creating a temporary gap in the

light in a fiber optic cable is considered to be cloaking time is because of the type of duality that exists between space and time in electromagnetic theory, which says in short, that diffraction and dispersion are symmetric in spacetime.

If only the technology could be expanded to real world size, you could step between two lenses, and do anything you wish, and it would never be recorded in time; for the rest of the world, it would never have happened. Alas, it's not to be however, the researchers point out that they don't expect the technique could ever produce a gap that lasts any longer than 120 microseconds, not nearly enough time to do anything worth hiding.

More information: Demonstration of temporal cloaking, arXiv:1107.2062v1

Abstract
Recent research has uncovered a remarkable ability to manipulate and control electromagnetic fields to produce effects such as perfect imaging and spatial cloaking. To achieve spatial cloaking, the index of refraction is manipulated to flow light from a probe around an object in such a way that a "hole" in space is created, and it remains hidden. Alternatively, it may be desirable to cloak the occurrence of an event over a finite time period, and the idea of temporal cloaking was proposed in which the dispersion of the material is manipulated in time to produce a "time hole" in the probe beam to hide the occurrence of the event from the observer. This approach is based on accelerating and slowing down the front and rear parts, respectively, of the probe beam to create a well controlled temporal gap in which the event occurs so the probe beam is not modified in any way by the event. The probe beam is then restored to its original form by the reverse manipulation of the dispersion. Here we present an experimental demonstration of temporal cloaking by applying concepts from the time-space duality between diffraction and dispersive broadening. We characterize the performance of our temporal

cloak by detecting the spectral modification of a probe beam due to an optical interaction while the cloak is turned off and on and show that the event is observed when the cloak is turned off but becomes undetectable when the cloak is turned on. These results are a significant step toward the development of full spatio-temporal cloaking.