# Measuring the Speed of Light in Composite Materials

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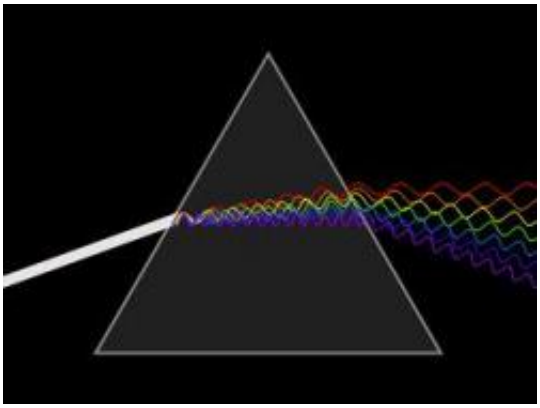

Light slows down in different mediums, depending on the medium's index of refraction. Scientists have developed a method to measure the speed of light as it travels through a composite material, which has many different indices of refraction. Credit: Wikimedia Commons.

(PhysOrg.com) -- Although the speed of light is constant in a vacuum, light slows down a small amount when traveling through other materials. While it's relatively easy to measure the speed of light in mediums made of one material, it's much more difficult to track light's speed through composite materials. Now, a new technique can determine the speed of light in composite materials by varying the pressure of light.

Sanli Faez and colleagues from the FOM Institute for Atomic and Molecular Physics in the Netherlands have presented the new method in

an upcoming issue of Physical Review Letters.

When light enters a substance, such as glass, its speed is reduced based on how it hits the atoms in the material. In turn, this determines the material's index of refraction, which is the ratio between the speed of light in vacuum and the speed of light in the medium. Composite materials, being made of many substances, have many different indices of refraction. This causes light to scatter a lot, making it difficult to measure the material's overall index of refraction.

In the new technique, the researchers use a pressure chamber to alter the composite material's index of refraction. By shining laser light through a filter sitting in a pressure chamber, the researchers created a speckled interference pattern. By changing the pressure, the researchers could then alter the pattern. Then they compared how the pattern changed in relation to the pressure, which enabled them to calculate the change in refractive index and the speed of light.

Understanding how light interacts with composite materials could lead to several applications. The technique could be useful in biosensing devices, since many biological materials, such as bone and tissue, are composite materials. It might also have applications in testing pharmaceutical pills by measuring irregularities in the interference patterns.

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