Anti-Lasers/Coherent Perfect Absorbers

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Description:
Conventional lasers, use a medium, usually a semiconductor like gallium arsenide, to produce a focused beam of coherent light, producing light waves with the same frequency and amplitude that are in step with one another. Some uses of conventional lasers include spectroscopy, remote sensing and measurement techniques.

Solution: Scientists at Yale University have built an anti-laser, in which incoming beams of light interfere with one another in such a way as to perfectly cancel each other out resulting in a coherent perfect absorber (CPA) that supports a purely incoming radiation pattern, with complete absorption and zero reflection.

Field of Application:

- Supercomputing whereby optical switches, detectors and other components in the next generation of computers can potentially be powered by light in addition to electrons.
- Laser interferometers whereby there is controlled delivery of energy to the device and this may be useful as detectors, transducers, and to measure distance to exceedingly high precision.
- Ring laser gyroscope which consists of having two counter-propagating modes over the same path in order to detect rotation, and is used for measuring or maintaining orientation and this may be useful in navigation of airplanes and ships, alignment of telescopes, survey of landscapes, and high precision measurements.

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