Anti-laser can make any object suck in light

A maze of mirrors and lenses turns any material into a highly efficient light absorber and could be used for detection of faint light or charging distant devices with light

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By **Karmela Padavic-Callaghan**


A beam of red light shines through a series of four lenses within a telescope-like device

A new anti-laser device uses mirrors and lenses to turn any object into a highly efficient light absorber.
Omri Haim, The Hebrew University of Jerusalem

Inserting any material into a special maze of mirrors and lenses can make it absorb light perfectly. This approach could be used to detect faint starlight or for charging faraway devices with lasers.

Ori Katz at the Hebrew University of Jerusalem in Israel and his colleagues created an almost perfect absorber of light by building an “anti-laser”.

In a laser, light bounces between mirrors until it becomes amplified enough to exit the device in a concentrated beam. In an “anti-laser”, says co-author Stefan Rotter at Vienna University

of Technology in Austria, light enters the device then gets stuck in an inescapable series of bounces within it.

The researchers achieved this by directing red light through a metre-long maze of carefully arranged lenses, mirrors and one piece of tinted glass. The glass was the intended light absorber. Light reflected off the mirrors and interacted with images of itself created by the lenses in such a way that it got redirected every time it came close to exiting the device.

Before it was inserted in the device, the glass could absorb 15 per cent of light. The whole device, in contrast, absorbed about 98 per cent of the light that entered it, effectively increasing light absorption of the glass more than six-fold.

Sahin Ozdemir at Pennsylvania State University says that, previously, similar devices perfectly absorbed only specific light wave shapes and only when they were illuminated at particular angles. The new "anti-laser" works for all shapes and angles, so it is much more practical, he says.

Ozdemir says that the method could be used to collect light from very faint stars. It could also be used for efficiently charging bigger devices with the energy of absorbed light, like charging a drone by hitting it with a laser from a distance, says Katz.

However, Yidong Chong at Nanyang Technological University in Singapore says that the device may have to be miniaturised and integrated onto a chip before it can be incorporated into useful devices. Currently, the maze of instruments sprawls across a laboratory table, so it is larger than some devices like drones, and vulnerable to lenses or mirrors accidentally being knocked over.

Rotter says that in addition to making the device smaller, the team wants to boost its versatility even further by making it absorb light of many colours simultaneously with near perfection.

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