

Laser puts SA's scientists at cutting edge

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South African scientists have devised a novel way to shape a laser beam, a technological advance they say could have large-scale applications in medicine, telecommunications, and high technology manufacturing.



Derek Hanekom (Image: GCIS)

Conventional lasers either do not shape the light at all, or use costly custom-made optics to do so. Now scientists from the Council for Scientific and Industrial Research (CSIR) have created a relatively cheap system that allows them to shape the beam inside the machine.

"You can decide at a moment's notice the shape you would like," CSIR mathematics optics research group head Andrew Forbes said.

The research, announced at a press conference on Tuesday (17 September), was published in the prestigious UK-based journal *Nature Communications* on 2 August. An international patent application is pending, said Prof Forbes.

A typical laser device stimulates the atoms of a medium (such as Argon gas) with radiation so that it emits high-energy light particles called photons. Two mirrors on either end of the device are used to create a concentrated beam of light, which can be used for writing compact discs, performing fine surgery or scanning groceries.

LCD replaces mirrors

The laser devised by the CSIR scientists replaces one of these mirrors with a liquid crystal display (LCD) programmed with a gray-scale image that triggers a calculated change to the light inside the device to the shape the beam it emits.

This digitally rendered LCD image can be manipulated at the click of a button. "We showed that by sending an appropriate

picture to the LCD any desired laser beam could be created inside the device," Prof Forbes said. "This is a significant advancement from the traditional approach, which requires costly optics and realignment of the laser device for every beam change. Since this is all done with pictures, the digital laser represents a paradigm shift."

CSIR researcher Sandile Ncgobo, conducted the experiments published in Nature Communications as part of his doctoral thesis, said: "I believe this will be a disruptive technology, which could create new markets and value networks in the next decade."

Science Minister Derek Hanekom said the digital laser was "groundbreaking" and would put South African scientists in the history books alongside Albert Einstein, who helped to lay the theoretical groundwork for the design of the first lasers in the 1960s. "(It) is further evidence of the great potential we have in scientific innovation," he said.

Hanekom said the CSIR's digital laser was the latest addition to SA's list of "firsts", which included the first heart transplant, the invention of Pratley Putty (used in the 1969 Apollo 11 moon landing), and the Kreepy Krauly pool cleaner. "Local scientists also pioneered the computerised axial tomography scan, known as the CAT scan," he added.

Source: Business Day via I-Net Bridge

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