Light Stopped in its Tracks

"Light is very good at transmitting information," says Dr Matthew Sellars. "The only trouble is, it's very, very fast. You need to hold it for a while or otherwise it just zips off."

Holding light still is no longer an absurd goal. Sellars is the leader of a team at the Australian National University's Laser Physics Centre that has succeeded in stopping light for more than 1 second, 1000 times longer than the previous record.

"We use a small silicate crystal doped with a rare-earth element, praseodymium. It is on the praseodymium ions that we store the light pulse," Sellars explains.

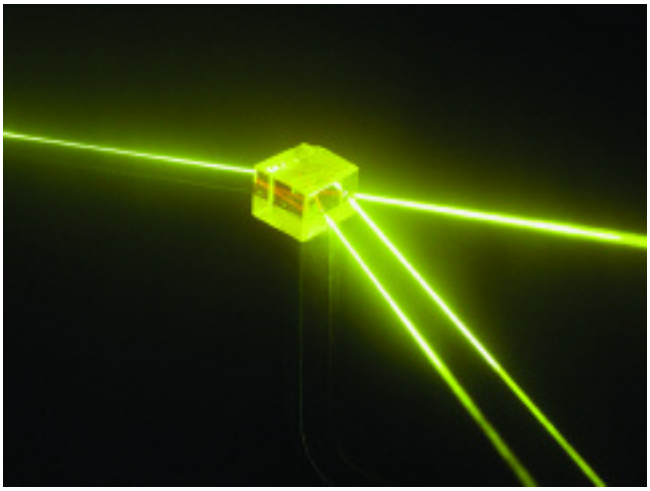
"When we shine a laser pulse at this crystal, it's normally absorbed. The light doesn't get through the crystal. Then we add a second laser beam that turns on the coupling between the nuclear spins and the light. This coupling makes the crystal transparent. So when we now fire the first laser beam at it, it gets through, but the odd thing about it is that it takes a very long time to do so."

Within the crystal the light is slowed to a few hundred metres per second. If the second laser is then turned off, the light becomes trapped in the crystal – its speed effectively reduced to zero.

"The light is stored as quantum superposition states of the ions inside the crystal," Sellars explains. "How long we can keep the light in there depends on how long we can preserve these states."

A number of adjustments have enabled the ANU team to hold the state for periods of time humans can observe, rather than the microseconds achieved previously. They have shown that in theory it should be possible to hold light inside the crystal for 30 seconds.

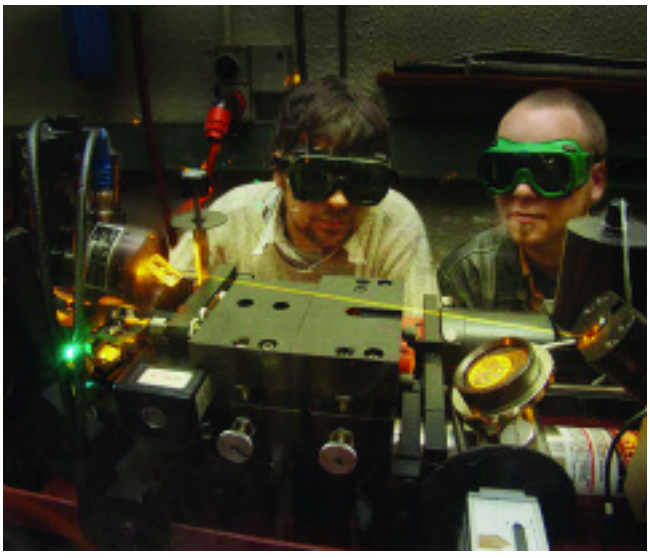
The team wants to see if it can make a quantum computer correct for errors, just like ordinary computers do. "If correcting works these times are long enough. We don't need to hold light indefinitely," Sellars says. "If correcting doesn't work then quantum computing is in trouble."



Laser beams can make a yttrium silicate crystal doped with praseodymium, such as this one, transparent or absorbent of light, allowing one beam to be trapped inside.

The next stage is to try to trap a single photon of light inside the crystal, a necessary development for quantum computing. Sellars says that large crystals will be needed for this. "At the moment, of a million photons most get through and only a few are stored. With a larger crystal we can increase the efficiency of trapping."

Many techniques are being used in the quest to develop quantum computers. Sellars says the advantage for his team is that the crystals are relatively easy to grow, allowing them to focus on determining whether quantum computers would work as the theoreticians have suggested. Other techniques often rely on nanotechnology, which is far harder to make.



Researchers at the Australian National University have found a way to stop light for more than 1 second.

Evolutionists Advocate "Intelligent Design"

It's a tough time to be an evolutionary biologist. Not only are you prey to the funding cuts that make science tough across the board, but you also have to put up with the Science Minister calling for creationism-by-stealth to be taught in schools (see pp.32–34).

Some, however, are fighting back. The Australasian Evolution Society is open to both professionals and amateurs engaged in evolutionary research. It held its fourth annual conference in September and also released the first edition of a newsletter.

The newsletter reached *Australasian Science* as an email attachment in which its editor, Dr Greg Adcock of the Australian National University, begins: "Attached is a sparkling new members newsletter that I hope, with members' input, will grow and mature in future issues. As we know, intelligent design helps to make things better."

We hope he's talking about intelligent *newsletter* design.