
IS LIGHT SLOWING DOWN?

The idea that light travels at the same speed, irrespective of the location or motion of the observer, is central to Einstein's theory of relativity. But is that speed the same for all time?

For some years theories have been circulating to suggest that light is slowing down (*AS*, September 2002, pp.4–5). Dr João Magueijo of Imperial College, London, suggested in 1999 that light was slowing down, but his ideas were attacked for lacking experimental support.

In 1999 and 2001 Dr John Webb and PhD student Michael Murphy of the University of NSW produced evidence

suggesting that when light from distant quasars passed through clouds of gas billions of years ago it experienced different absorption to what it would today. This absorption is determined by the fine structure constant (α).

"The light that comes to us from a quasar has been travelling for most of the age of the Universe – several billion years – and it carries with it information about what happened to it along the way," Murphy says.

UNSW theoreticians also noted that α is defined by the charge on the electron, Planck's constant and the speed of light. For α to have changed at least

one of these must also have changed. They argued that the speed of light was the most likely suspect.

Change in any of α 's components would force a major rewrite of the laws of physics. Consequently, confirmation of Webb and Murphy's work is important.

Webb and Murphy are working with international collaborators to use the world's largest optical telescope, the Very Large Telescope in Chile, to check their findings. "We are working flat out on the best sample of quasar data the world has ever seen," Webb says. "We now have a small 'factory' of six students and several senior scientists analysing this data."

CSIRO Research Priorities Signal Job Cuts

Self-healing polymers, "clean" coal and radio astronomy are CSIRO's research priorities for the 2006–07 financial year, but there will be job losses in agriculture, manufacturing and possibly renewable energy.

The organisation's total appropriation funding for the year is \$608 million, an increase of \$14 million on the current year. Of this, \$158 million will go to the Flagships program, an increase of 24%. Figures do not appear to have been adjusted to take account of inflation.

The largest gains are for information and communications technology and mathematics, with increases of 16% and 17%, respectively.

Funding is being allocated by themes rather than by division, and the announcement only deals with appropriations funding rather than the external funding that makes up more than one-third of CSIRO's overall budget. Consequently, it is not always easy to tell how sections of CSIRO will be affected.

CSIRO Deputy Chief Executive Ron Sandland described advanced materials for manufacturing as one of the "current hot spots of science" and

looked forward to strong, light polymers capable of responding to their environment in ways that will make them suited to a new generation of implants. An extra \$11 million will be injected into this area.

Sandland also highlighted an extra \$0.5 million for radio astronomy. "We will be reaching for the sky by building a new radio astronomy facility (xNTD) in WA which will improve survey speed by a factor of 30," Sandland said. "With other infrastructure this will increase Australia's chances of being identified in 2006 as the best site for the Square Kilometre Array" (*AS*, Jan/Feb 2006, p.47).

Probably the most controversial decision described in the report is to "restrict our activities in renewable energy to those in which we have competitive advantage" while increasing funding for low CO₂ emission fossil fuel research by 9%. It appears the areas of competitive advantage primarily refer to the production of hydrogen from solar energy.

The CSIRO Staff Association expressed concern that the decision-making process to led to the decision rather than specific allocations. "To

some extent it seems the management is second-guessing what the government wants, rather than being provided clear and transparent directions," said Dr Michael Borgas, President of the Staff Association.

"I guess the reason they don't do this is that then they would be required to adequately resource the organisation," Borgas added. "Our priority is that CSIRO be resourced so that the capability of the organisation is maintained along with the directed research projects."

Former Chief of CSIRO Entomology, Dr Max Whitten, said that "the priorities package is symptomatic of a shift towards centralised decision-making that is crippling CSIRO".

"CSIRO's long history of success did not derive from central control of its activities," he said, "but rather from the Divisional structure in which Chiefs and their scientists had close linkages to potential end users."

Whitten said that CSIRO's CEO, Dr Geoff Garrett, has "gone down the pathway of dissolving the Divisional structure and creating a massive central team whose funding comes entirely from appropriation".