

Hot air, hot topic

This content has been downloaded from IOPscience. Please scroll down to see the full text.

1993 Phys. World 6 (12) 19

(<http://iopscience.iop.org/2058-7058/6/12/17>)

View [the table of contents for this issue](#), or go to the [journal homepage](#) for more

Download details:

IP Address: 131.247.112.3

This content was downloaded on 09/07/2016 at 17:26

Please note that [terms and conditions apply](#).

Hot air, hot topic

We are forced to agree with Tony Jones (Reviews, November p44) that climate scientists are failing to get the issue of greenhouse warming over to the public. If a science writer such as Jones hasn't grasped the bare essentials, what hope is there for the layperson?

Jones found it strange that everyone could "agree that global warming was taking place but ... could not be attributed to the greenhouse effect". This is hardly a strange argument, and is precisely the position maintained in the Intergovernmental Panel on Climate Change reports of 1990 and 1992.

Observational evidence of global temperature over the last century shows a rise of approximately half a degree. Not outside the range of natural climate variability, but a sizeable rise. However, on its own this evidence proves nothing about the cause of the warming.

Concern about global warming is, at the moment, based almost entirely on theory. Without exception, results from global-circulation models run over the last decade have indicated that a doubling of carbon dioxide concentration would induce significant changes in global climate. Attempts to reproduce the temperature record of the last century with some of these models results in "patchy" agreement. Overall there is a broad similarity of trend, but because of the noisy signal it is simply not possible at present to attribute in a statistically rigorous way any or all of the details of the warming to the greenhouse effect.

So in the face of such fuzzy evidence, why is global warming being taken so seriously? It comes down to three "ifs", all of which arise from the models (or the physics, chemistry and biology embodied therein) rather than from the observations:

- If our basic understanding of climate is correct, then the growing levels of greenhouse gases will present the biggest single perturbation of the Earth's radiative balance, including volcanic eruptions and solar variability, since humans appeared on the planet. It will also represent the fastest-changing factor.

- If our understanding of ocean circulation and biogeochemical cycling is correct, then the growing atmospheric burden of greenhouse species cannot be slowed or reversed over short timescales.

- If the model predictions of climate change are not fundamentally flawed, then some regions of the world are likely to experience substantial economic disruption as a result of mankind's influence on climate.

In the future, if the enhanced greenhouse effect is real and significant, then its signal will begin to become detectable in the observations, hence the considerable effort being invested in international programmes to improve the observational

database. At the moment, however, the observed data are not central to the greenhouse argument.

Bruce Callander

Technical Support Unit for Intergovernmental Panel on Climate Change

Chris Folland

Meteorological Office, Bracknell, UK

Blue moves

I have some comments to make about a quote featured in your editorial (November p3) concerning the development of blue-green semiconductor lasers by Sony Corporation in Japan. The quote is from an IEE publication: *Semiconductor Lasers and Packaging - an Insight into the Japanese Optoelectronic Industry* and states "... We should ask why they did the work in the first place, and indeed why no European or American company has done so".

There is, I believe, little secret as to why companies are interested in developing short-wavelength lasers. Primarily they can be used to increase the capacity of optical storage media - the shorter the wavelength, the smaller the diffraction-limited spotsize to which light can be focused and hence the greater the density of encoded information which can be read. Secondly, integrating blue and green lasers with existing red lasers could result in colour laser printers, whilst light-emitting diodes covering the entire visible region of the spectrum could potentially be used in flat panel displays.

Sony has certainly pioneered much of the development of short-wavelength lasers. You may also be interested to know that the first blue-green semiconductor laser, albeit operating at 77 K, was produced by the 3M company in the US along with a consortium of seven universities. In addition, Heriot-Watt University has developed blue semiconductor lasers; there may well be others.

Robert Thomas

SRI International, Croydon, UK

The SSC and peer review

Having followed the arguments for and against the Superconducting Super Collider (SSC), I have two comments to make on Francis Slakey's article "Painful lessons from the SSC" (Forum, October p19).

The first concerns the possible conceptual ("philosophical") inadequacy of the SSC, and the second, the logistical inconsistency of a peer review argument.

The American economy is in deep trouble. The fiscal, social and infrastructure problems are enormous. Luring the American public into spending an extra \$11 billion to find out what happened one-trillionth of a second after the Big Bang (if there was one) sounds like throwing a lavish party after declaring a bankruptcy.

However, even within the purely physical argument the whole promise was not that obvious: the energies that the SSC was supposed to reach are still many orders of magnitude below that likely to hold the real clues to a grand unification and the mystery of the origin of ("our") Universe.

Although in absolute figures the energy is not that high (about the kinetic energy of a jumbo jet) we still cannot figure out how to focus this energy on a single particle. This is a magnificent testimony of our intellectual limitations (Nature is smarter than us - it knew how to achieve this focusing by arranging the Big Bang in the first place). Therefore, at a gross scale the SSC may just happen to be a modern version of the Tower of Babel - both are based on a similar mind fallacy.

Perhaps one day we may indeed figure out how to focus macroscopic energies on single particles. The solution, however, will most likely come from "small-scale" science, not from the megaprojects. Some clever use of quantum nonlocalities, vacuum energy fluctuations and single-mode (solitonic) effects for this purpose is not that inconceivable. However, the tendency to think "big" seems perpetual - recall that 1950s predictions about computers were almost invariably based around mainframes taking up a space the size of the Empire State building. We now carry them around in briefcases.

My second point relates to the circularity of a peer-review (PR) argument. In the case of the SSC the major peer-reviewers were undoubtedly drawn from the top level of the high-energy physics establishment. The said peer reviewers are, of course, fully supportive to their own megaproject because it raises the relative importance and visibility of their research community at the expense of many other scientific and social targets.

Recently there have been several studies showing the general unreliability, unfairness, and counterproductiveness of virtually all forms of PR. As a rule, PR is especially intolerant towards innovative ideas originating from "small" science. These (and not the overblown, overcontrolled and politicized megaprojects) are the genuine sources of almost all scientific and technological progress. In the case of the SSC, the reference to expert PR sounds similar to having General Motors peer-reviewed by the American Car Dealers' Association.

Alexander A Berezin

Department of Engineering Physics, McMaster University, Hamilton, Ontario, Canada

Letters to the Editor should be sent to *Physics World*, Techno House, Redcliffe Way, Bristol BS1 6NX, UK (Fax: +44 (0)272 251942. Electronic mail: pwld@uk.co.ioppublishing within JANET; pwld@ioppublishing.co.uk outside JANET). Letters should be as concise as possible and *Physics World* reserves the right to shorten them further. Please include a phone number where you can be contacted.