

John C. Mather

Politics and prophecy

John Mather and George Smoot's discovery of the anisotropy of the cosmic microwave background radiation won the Nobel Prize in Physics 2006.

Are scientists under-represented in politics? And do established scientists, especially Nobel laureates, have a duty to become active in politics and science policy?

Yes, I do think scientists are under-represented in politics, as are most professional groups. At least in the United States, most politicians are lawyers with little or no background in technical subjects. But being a Nobel laureate conveys no expertise in political matters, and I think it's important for any newly-active political person to be cautious before jumping into debate. I have spent a little of my Nobel prize money, working through the American Institute of Physics, to start summer internships for undergraduate physics students to gain experience working on Capitol Hill. There are currently three physicists working in the House of Representatives and the Senate, but to increase that number we need to find people who have the special combination of talents to be politicians as well as scientists.

What would be the one discovery that would herald a scientific revolution in the 21st century?

Room-temperature superconductivity could enable efficient sharing of electrical power around the world, changing the economic balance dramatically. It could also enable magnetic levitation for transportation, changing the entire structure of nations. Similarly, any other discovery or innovation that changes the availability of energy for food, transportation and shelter would have extraordinary impact.

How can the public be convinced of the importance of fundamental research with no applications in sight?

I don't think 'convince' is the right word. How about 'inspire'? I think every researcher has the opportunity to show members of the public how exciting new discoveries are, and how they lead to knowledge that may eventually be applied. There are many stories about fundamental research that led to world-changing applications. Who would have thought that atomic

clocks of extraordinary precision would be flying in space to run the GPS systems that people use to pilot their cars and planes? Let's not be shy. Although apocryphal, the quote attributed to Faraday is apropos: "Someday you can

"We need people who have the special combination of talents to be politicians as well as scientists."

What is the future of the standard model if the elusive Higgs boson and the even more elusive neutrinoless double-beta decay are discovered?

Hard to guess. Maybe it will still be the standard model, but with frills. The bigger question is always quantum gravity, or the alternative possibility that there is no such thing and we have no clue about the nature of space and

tax it." More directly, everything we have in modern society, from food to shelter to jet airplanes to iPhones, is the result of discoveries that were once seen as having no applications in sight.

PROFILE

- Based at NASA Goddard Space Flight Center, Greenbelt, Maryland
- Born on 7 August 1946, in Roanoke, Virginia into a family of scientists and teachers
- Earliest memory is having his tonsils removed, aged 2½
- Came first in a state-wide physics contest in 1963
- 1974 received a PhD in physics from the University of California at Berkeley and started working with NASA in Goddard
- Married Jane Hauser in 1980
- The \$160 million COBE (Cosmic Background Explorer) satellite was launched by NASA on 18th November 1989
- Since 1995 has been senior project scientist for the James Webb Space Telescope at NASA

time. That would not surprise me a bit.

What is the most practical and relatively safe alternative energy source?

So far none is the obvious winner. Solar and wind power are widely distributed and could become dominant with additional economies of scale and with subsidies comparable to those given for fossil fuels. Neither solar nor wind power is intrinsically polluting (though they disturb the neighbourhood and alter the landscape), but both technologies currently use exotic materials that themselves could be in short supply.

Moreover, we have become accustomed to the extremely inexpensive energy of fossil fuels; I suspect we are already living well beyond the

level of energy consumption that can be sustained in the long run. So people should not be too surprised if dramatic and disastrous changes occur in the global economic system as energy becomes scarcer. Perhaps it would be good to plan for change? But Tiresias and Cassandra, given the gift of prophecy, were cursed so that people did not believe them. Exercise for the reader: why is that?

What valuable advice would you give all young researchers who are starting their research life so as to become a good scientist?

Number 1: study reading and especially writing! And then, practise public speaking. The ability to explain logically, intuitively and viscerally why something is true is essential to planning research strategy, explaining results and obtaining funds for future work. There's really no substitute for good communication. And it will be valuable wherever life takes you.

