

Physics of Tao

He is among the most celebrated physicists of our time. Known for his pioneering work on black holes, Roger Penrose was knighted for his contribution to science in 1994. Of late, he has been working on the problem of explaining consciousness within the framework of physics. The Oxford professor was recently in the Capital to deliver a lecture organised by the Centre for Philosophy and Foundations of Science. He spoke to Abhishek G Bhaya:

Recent observations indicate that a super-massive black hole is gobbling up matter from the Milky Way. Will all stars, planets etc eventually disappear into the black hole?

Although it's called the supermassive black hole, it's relatively tiny in relation to the galaxy. Not all stars are going to find their way into that little hole. There's no threat of the solar system getting even close to that black hole for thousands of years.

There are several models of the universe doing the rounds in scientific circles, the big bang theory being the most accepted one. Will we ever find out for sure how the universe started and how it will end?

You've to bear in mind that physicists are very excitable people. If they come across a new theory, they promote it as the answer to everything. Then a few years later, the same theory is replaced by yet another hypothesis. Just like any other theory, the big bang theory is not perfect. Maybe we'll get better theories in future. I believe there's a reasonable chance of understanding the beginning and the end of the universe but we are certainly not there yet. Finding a way to unite quantum mechanics with general relativity will be a significant step in that direction.

For decades, physicists have been searching for a 'grand unified theory' that will explain all phenomena in the universe. Are we any closer to that elusive theory?

Whether such a theory could actually be devised is anyone's guess. People who make over-ambitious statements of this nature are deluding themselves. Most theories that scientists (including myself) are working on are going to be a long way from anything that could be referred to as the 'theory of everything'. Even Einstein couldn't succeed in his efforts to formulate a unified field theory aimed at bringing together the forces of nature.

What answers does science provide for the mysteries surrounding life and death?

Science speaks very little at the moment on such issues. It surely is the business of science to try and answer some of these questions. Perhaps, this may only happen when we arrive at a scientific explanation for the concept of consciousness. Sooner or

later, we need to have a theory, which can at least begin to come to terms with what consciousness is all about.

Can you talk a little about your work on the nature of mind and its relation to theories of physics?

Many people would say that mind is just a very complicated computer. I don't agree with that analogy. To understand the concept of mind and consciousness, people generally depend on the study of brain and neurochemistry on the one hand and religious and psychological perspectives on the other. My position is different. I believe that although the elements and processes responsible for the existence of consciousness are present in the physical world, they lead to the formation of consciousness only in the right kind of structures such as the brain. I am working on a book, *Road to Reality*, that deals with these ideas. At present, physics cannot help in the study of mind. What is needed is a wholly different kind of physics. The key again lies in the unification of small-scale physics of the quantum world with the large-scale physics of the classical world.

Some eastern philosophies maintain that answers to all mysteries of the universe lie within our mind. Do you agree?

It depends on how you phrase it. In a certain sense, I am saying something similar.

However, I am not implying that the quest for knowledge ends in meditation. We'll have to explore within ourselves to take science forward. In principle, you might be able to acquire knowledge internally but in practice, you'll require help from observations in the physical world.

Q&A

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Liberty/hankar

People refer to modern science as western science. Is it justified to put such labels on science?

I would be ashamed if what I did was called western science. Science is universal. My western background may have influenced my modes of thoughts, but that can be as much a distraction as a guide in my scientific quest.

What about the conflict between science and religion?

The conflict between science and religion can be seen as an extension of the conflict between different religious outlooks. We need to realise that the growth of new knowledge will necessitate a revision of religious beliefs. I've to confess that I am not a religious person as I don't follow any particular creed. Nevertheless, the questions raised and addressed by various religions are quintessential to human existence. Although science has not made any significant headway towards answering these questions so far, I think, it needs to broaden its horizon to take on board such questions.