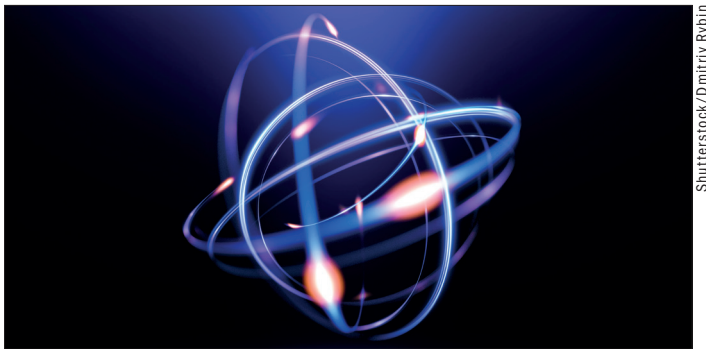


A tale of two theories



It has occurred to me that there is a striking parallel between the current debate on the multiple interpretations of quantum mechanics, and the arguments that raged over the astronomical theories of the solar system, nearly 400 years ago.

Penrose is right; wavefunction collapse is real

Nicolaus Copernicus

I have a new theory that all the planets circle around the Sun. I know that means we would probably all fall off the Earth and that the crystal spheres would probably collide with each other, but the maths is so simple and it fits all the appearances – so, well, my theory must be correct. It makes no sense to ask why Mars follows the path that it does because heavenly bodies are not like terrestrial ones and cannot be expected to obey the same laws as objects here on Earth. Just use the theory to get the answers you want and stop worrying about how it all works.

Pope Clement VII

Copernicus is basically right, but we can say why the planets move in the way that they do – they are propelled on their courses by a cloud of angels. And the reason that we do not fall off the Earth is equally simple: God has ordained it that way.

Tycho Brahe

Copernicus is right but he made an additional unwarranted assumption – namely that the Earth moves too. There is absolutely no evidence for this; indeed, all the evidence is to the contrary. Yes, the planets circle around the Sun, but the Sun obviously circles around the Earth. The Earth itself is stationary. All this seems to me to be so patently self-evident, I can't think why other people should disagree with me.

Galileo Galilei

No. Copernicus was right. The Earth does move. I do not know why we do not fall off the Earth as it swings around the Sun but if we persist in denying the obvious fact that all the planets including the Earth orbit the Sun we shall never understand the true laws of force and motion that govern the behaviour of all things both heavenly and terrestrial.

Isaac Newton

Galileo was right; the Earth does move; and I have discovered the laws of force and motion, which explain everything perfectly.



Niels Bohr

I have a new theory that describes the behaviour of things like electrons by assuming that they behave more like waves than particles. Okay, I know this means that an electron can effectively be in two places at once but the maths is so elegant and gets such accurate answers that the theory must be correct. It makes no sense to ask where the electron is when you are not looking at it because electrons are not like classical objects. Things only revert to classical mode when a measurement is made. Just put your faith in the mathematics and stop worrying about how it all works.

David Bohm

Bohr is basically right but we can explain why electrons behave as they do – each electron is guided by a thing called a pilot wave. But when a measurement is made, the wavefunction collapses and the electron looks like a particle again.

Hugh Everett

Bohr is right but he made an additional unwarranted assumption – namely that the wavefunction collapses. There is absolutely no evidence for this; indeed, all the evidence is to the contrary. Yes, the wavefunction develops, describing more and more possible worlds, but it simply never collapses. All this seems to me to be so patently self-evident, I can't think why other people should disagree with me.

Roger Penrose

No. Bohr was right. Wavefunction collapse is real. I do not know what causes it (perhaps it is something to do with gravity) but if we persist in denying the obvious fact that the superposition of multiple worlds is only temporary, we shall never understand the true laws of quantum physics that govern the behaviour of things both large and small.

Oliver Linton

Penrose is right; wavefunction collapse is real; and I have discovered...

How I wish I could complete that last paragraph. Is it too much to hope that, in the not-too-distant future, someone reading this article eventually will?

Oliver Linton is a retired physics teacher, e-mail jolinton@btinternet.com