Quantum teleportation tipped for Nobel Prize: Thomson Reuters

Chris Wickham, Reuters

(Reuters) - Researchers who wrote the rulebook for quantum teleportation, described as "spooky" by an exasperated Einstein, are among the 2012 Thomson Reuters tips to win Nobel prizes for science.

Nobel prediction expert David Pendlebury's annual forecasts are based on the company's "Web of Knowledge" data on how often a scientist's published papers are cited as a basis for further investigation by other researchers.

Winners of the 2012 Nobels are due to be announced in early October and although they are notoriously hard to predict, over the last decade 26 people from Pendlebury's list have won.

"We're not trying to pull a rabbit out of the hat," he said. "We're trying to demonstrate that citations in the literature are a strong indicator of peer esteem, which is the basis for awarding top prizes for research, such as the Nobel."

Based on that, Pendlebury picks IBM researcher Charles Bennett, Gilles Brassard at the University of Montreal and William Wootters at Williams College in Massachusetts for their description of the protocols for quantum teleportation.

Quantum teleportation transfers information between two points without anything physical, like a radio wave, passing through space.

This means it can't be intercepted and could provide a basis for totally secure mass communications, super-fast quantum computers and, eventually, a quantum internet much more powerful than the one we have today.

It relies on the process of 'entanglement' between two particles, which physicists have used to create a perfect replica of a single particle of light at some distance from the original.

Work done by Bennett and his colleagues in 1993 has been cited over 5,300 times - that's 300 times more than the average physics paper published in the same year - and it has since been verified in experiments over increasing distances.

Earlier this month, an international team of scientists set a new record by reproducing the characteristics of a photon over 143 kilometres, between two observatories in the Canary Islands.

Rupert Ursin from the Austrian Academy of Sciences, who was part of that team, said physicists now understand the process enough to produce it and use it in the

real world, but it remains quite mysterious.

"Entanglement is a bit weird," he told Reuters. "You have to give up your classical world view".

Other contenders for the physics prize include the 1990 discovery by British scientist Leigh Canham that porous silicon can emit light, which could be used in a new generation of microelectronics based on light pulses rather than electrons.

And making light slow down to the speed of a bicycle, described in a 1999 paper by U.S.-based researchers Stephen Harris and Lene Hau, also makes the grade for the Nobels, according to Pendlebury.

Hau and her team at Harvard went further in 2001 by bringing laser light pulses to a standstill for a thousandth of a second in a magnetically trapped ultra-cold cloud of sodium atoms.

Real world applications are far off but it does offer the potential for a technology that can shine light through opaque materials.

HIGGS BOSON HEADACHE

An omission from this year's list is Peter Higgs following the celebrated discovery at the CERN research centre of a new subatomic particle which appears to be the boson imagined by him in the 1960s.

Although cosmologist Stephen Hawking confidently predicted a Nobel for Higgs at the time, Pendlebury said it is probably too soon and Alfred Nobel's demand that the prize should go to no more than three people is another complication.

There are five theorists still alive today with a reasonable claim on the Higgs boson because work from all of them was published around the same time as that done by Higgs in 1964.

For that reason, and the fact that the average time between a discovery and a Nobel is now about 25 years, Peter Higgs might have to wait a bit longer.

"Then again, I may be wrong," said Pendlebury

INSIDE THE CELL

Research into the inner workings of the cell dominates Pendlebury's list for the medicine prize.

Among them, American scientists David Allis and Michael Grunstein are tipped for the work in the 1980s on epigenetics, the study of the mechanisms that activate and de-activate genes, which is one of the root causes of cancer.

The question of why it is possible for one genetically identical twin to suffer autism

or schizophrenia, for example, while the other does not, confounded science for some time.

DNA, which provides the blueprint for living organisms, is wrapped tightly around proteins called histones, which were long thought to be an inert packing material.

Grunstein and his colleagues showed that part of one of the histones in yeast is essential for the control of specific genes, which was the first demonstration of a direct interaction between histones and DNA.

Pendlebury said the discovery had far-reaching impact and has since led to the development of a range of medicines, including treatment for rare forms of lymphoma.

TITANIUM DIOXIDE REDISCOVERED

In chemistry, Akira Fujishima at Tokyo University of Science, could be in the running for discoveries over three decades up to the 1990s of new uses for titanium dioxide, long used mainly as an ingredient for paint.

Fujishima found titanium dioxide could be a catalyst for producing hydrogen from water when subjected to sunlight and later that water on its surface forms a film rather than the droplets dictated by surface tension.

If the coated surface is upright or on an incline the water runs off and this has led to the widespread use of titanium dioxide as a self-cleaning coating for glass.

It is especially useful for side mirrors on cars but Fujishima also demonstrated it could be used to clean disease pathogens off surfaces.

The technique is even used in Japan [1] to coat paving stones as a way of removing traffic pollution from the environment.

(Editing by Rosalind Russell)

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