LSU professor resolves Einstein's twin paradox

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Subhash Kak, Delaune Distinguished Professor of Electrical and Computer Engineering at LSU, recently resolved the twin paradox, known as one of the most enduring puzzles of modern-day physics.

First suggested by Albert Einstein more than 100 years ago, the paradox deals with the effects of time in the context of travel at near the speed of light. Einstein originally used the example of two clocks – one motionless, one in transit. He stated that, due to the laws of physics, clocks being transported near the speed of light would move more slowly than clocks that remained stationary.

In more recent times, the paradox has been described using the analogy of twins. If one twin is placed on a space shuttle and travels near the speed of light while the remaining twin remains earthbound, the unmoved twin would have aged dramatically compared to his interstellar sibling, according to the paradox.

“If the twin aboard the spaceship went to the nearest star, which is 4.45 light years away at 86 percent of the speed of light, when he returned, he would have aged 5 years. But the earthbound twin would have aged more than 10 years!” said Kak.

The fact that time slows down on moving objects has been documented and verified over the years through repeated experimentation. But, in the previous scenario, the paradox is that the earthbound twin is the one who would be considered to be in motion – in relation to the sibling – and

therefore should be the one aging more slowly. Einstein and other scientists have attempted to resolve this problem before, but none of the formulas they presented proved satisfactory.

Kak's findings were published online in the *International Journal of Theoretical Physics*, and will appear in the upcoming print version of the publication. "I solved the paradox by incorporating a new principle within the relativity framework that defines motion not in relation to individual objects, such as the two twins with respect to each other, but in relation to distant stars," said Kak. Using probabilistic relationships, Kak's solution assumes that the universe has the same general properties no matter where one might be within it.

The implications of this resolution will be widespread, generally enhancing the scientific community's comprehension of relativity. It may eventually even have some impact on quantum communications and computers, potentially making it possible to design more efficient and reliable communication systems for space applications.

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