Einstein's Relativity Theory 'Holding Up' After 100 Years, But Facing 'Competing Theories,' Duke Professor Says

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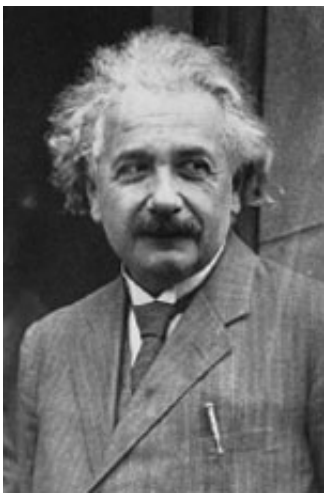

This Thursday, June 30, marks the centennial of Albert Einstein's first paper on the theory of relativity.
Over the last 100 years, relativity has been vindicated in numerous experiments and technological applications, said a Duke University astrophysicist and mathematician. But it has barely affected the way most people understand the universe and is still being challenged by some scientists.

"Over the past century, relativity theory has been holding up quite well,"

said Arlie Petters, who develops mathematics to describe the intricate ways that light is warped by massive objects in space, a prediction of relativity theory. “However, we must bear in mind that it took over two centuries before serious problems were found with Newtonian theory.”

Petters, a professor of mathematics and physics, is a co-author of the book “Singularity Theory and Gravitational Lensing.”

“There are still many tests ahead for relativity, especially those pertaining to gravitational waves and the extreme warping of space-time in the vicinity of black holes,” said Petters, who is preparing a paper that gives scientists mathematical tools for performing experiments to test relativity. “And, of course, there is a host of competing theories of gravity hoping to dethrone relativity.”

Space-time is the term for Einstein’s concept that space and time are interrelated phenomena. Gravitational waves are ripples in space-time produced by extreme cosmological events -- analogous to dropping a large rock on a pond.

However, relativity still predominates among scientific theories of space, time, light and gravity on macroscopic scales, Petters said. It has accurately predicted phenomena such as the exact orbit of the planet Mercury, the slight bending of starlight passing the sun and other cosmic observations. In fact, equations from relativity are essential for a now-common technology: the global positioning systems used in cell phones, electronic road maps and nautical navigation instruments.

Petters said relativity has been least successful, perhaps, in replacing in the public mind Isaac Newton’s conceptions of space and time as being absolutely fixed, and of gravity as an attractive force exerted by objects. But that’s understandable, he said. “It is nontrivial to switch to the General Relativistic viewpoint, namely, to think of gravity not as a

physical force, but as the result of the warping of space-time."

A profile of Petters is available at
www.dukemagazine.duke.edu/alumni/dm22/star.html

Source: Duke University