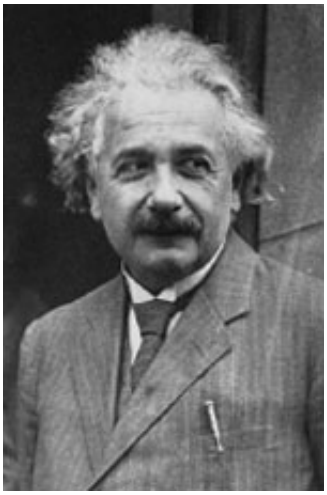
Watson Lecture: Exploring Einstein's Legacy

November 15 2005



November 25 marks the 90th anniversary of Einstein's formulation of his theory of general relativity, which describes gravity as a consequence of the warping of space and time.

Since then, physicists have been trying to understand and test general relativity's predictions, including the existence of black holes (which are made not of matter but of whirling space and warped time), gravitational waves, and the acceleration of the universe. "We don't understand the predictions very well because we are not clever enough to solve Einstein's equations when spacetime is highly warped and dynamical," says Kip Thorne, the Richard P. Feynman Professor of Theoretical Physics at the California Institute of Technology.

In his November 16 talk, "Einstein's General Relativity, from 1905 to 2005: Warped Spacetime, Black Holes, Gravitational Waves, and the Accelerating Universe," Thorne will discuss the progress that physicists have made in understanding warped spacetime, and he will discuss prospects for rapid future progress using gravitational wave detectors such as LIGO and supercomputer simulations.

"Einstein's predictions have turned out to reach into the domain of our every day technology. For example, time flows more slowly on the earth than it does in the Global Positioning System's satellites high above the surface of the earth. The software that computes where we are from the GPS signals must correct for the warping of time from there to here, or the system would fail," Thorne says.

Cosmologists deal with the warping of space and time "all over the sky," Thorne says, because the whole universe is warped. In the Big Bang, the birth of the universe, "everything came out of a singularity, a place where space and time were infinitely warped," he says. "My hope is that after this lecture the listener will understand what we mean by warped spacetime, and how Einstein came up with such a crazy idea in the first place."

The talk is the third program of the 2005-2006 Earnest C. Watson Lecture Series, and the last of four special lectures in Caltech's Einstein Centennial Lecture Series. The series celebrates the centennial of Einstein's annus mirabilis (miracle year) in 1905, when, at the ripe age of 26, he published three seminal papers proving the dual particle and wave nature of light and the existence and size of molecules, and creating the special theory of relativity and his revolutionary $E=mc^2$ equation.

Thorne's lecture will take place at 8 p.m. in Beckman Auditorium, 332 S. Michigan Avenue south of Del Mar Boulevard, on the Caltech campus

in Pasadena. Seating is available on a free, no-ticket-required, first-come, first-served basis. Caltech has offered the Watson Lecture Series since 1922, when it was conceived by the late Caltech physicist Earnest Watson as a way to explain science to the local community.

Source: Caltech