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# Robert Gowdy on Ripples in Space-Time

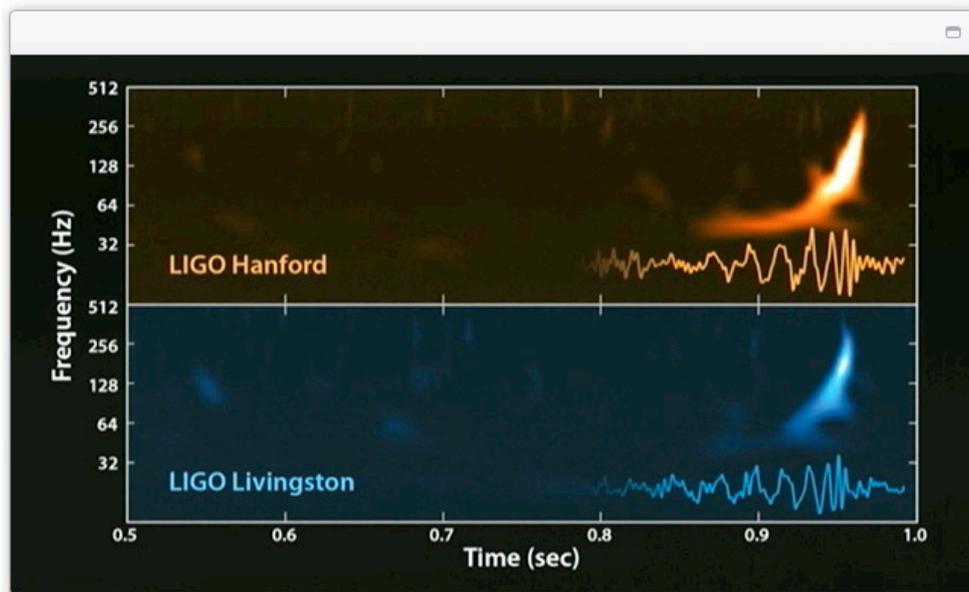
By Dan Gaitanis

In February, a team of scientists announced that they had detected the sound of two black holes, some billion light years away, and that it confirmed the last part of Albert Einstein's "Theory of Relativity." It was a very faint sound, picked up by two detectors in the United States.

There are three detectors: one in Livingston, Louisiana, another in Hanford, Washington, and one on the border between France and Spain. Having more detectors run at the same time makes it easier to tell where the signal is coming from because the researchers can pinpoint the location using all three points.

The detector consists of mirrors with long arms and laser beams. Light is split by the motion of the mirrors, and the distance to the mirror either increases or decreases. The change in distance is smaller than the length of the nucleus of an atom. The tiny waves make it difficult to distinguish between gravitational waves and real noise like an airplane or an earthquake. Finally, after managing to beat down the noise signal, the detector was turned on.

The scientists did not expect to see anything at first. The detector was shut down and reconfigured with increased sensitivity. After the reconfiguration, scientists were able to see three times what they originally saw. Three days later, they received a signal that stood above the background noise. The scientists agonized over whether it was a fluke.



*LIGO Update on the Search for Gravitational Waves*

Albert Einstein predicted gravitational waves, but spent years trying to figure out how to look for them. Einstein stated in general relativity that coordinates move around with everything else. If gravity consists of anything other than space time, there is a possibility that violent events could emit energy through other methods.

This recent discovery confirmed the theory Einstein proposed 80 years ago.

Robert Gowdy, a physics professor at VCU, stated that it would have been more exciting if Einstein had been proven wrong. There are over a thousand people working on this project. It is hard to predict who will get the Nobel Prize for this discovery because a number of the people involved in it are now deceased.

We have another way to observe the universe because of these detectors. “We can hear thunder from anywhere, but we can’t tell exactly where it is coming from,” Gowdy said. “With these new detectors, we’ll be able to find out exactly where the gravitational waves are emanating from.”



There is currently a proposal to build a fourth detector in India. Once that detector begins operating, scientists will be able to pinpoint exactly where a gravitational wave is coming from and will be able to point the telescope toward the waves to see what is happening. It was recently found that two black holes had converted three solar masses in a matter of seconds. If scientists are able to point a telescope to those black holes and see what is happening, we

can learn much more about the properties of black holes.

Gowdy noted that because they heard the waves only a few days after turning the detectors on, it probably wasn't pure luck. “It’s a new window on the universe, you start seeing things that you never expected. We’re probably going to get a number of head-scratchers.”