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Totowa manufacturer basks in its role proving Einstein theory

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There was no quaffing of champagne, no exuberant high-fiving at Reliance Electronics Inc. of Totowa last week when the company learned that it had played a role in a historic discovery affirming part of Albert Einstein's century-old general theory of relativity.

"Most of our products are successful, so there was no surprise," Peter Patel, the company founder and president, said Tuesday. He was one of three executives integrally involved in the custom electronics manufacturer's effort.

Yet there was a clear sense of satisfaction over the fact that an electronic circuit board made by the company, at the request of scientists at Columbia University, had played a part in the groundbreaking detection of gravitational waves that provided the first proof that Einstein's theory was true.

General relativity says that gravity is caused by heavy objects bending space-time. And when massive but compact objects such as black holes or neutron stars collide, their immense gravity causes space-time to stretch or compress.

Scientists say the waves they discovered stemmed from the collision of two black holes a billion light-years away, which sent ripples toward Earth that were picked up by antennas in Washington State and Louisiana. Einstein had predicted a century ago that such waves existed, but there was no direct evidence that they did until the recent discovery.

The circuit board was part of a device that could measure time down to a nanosecond, or billionth of a second, allowing scientists to measure the delay between the time the gravitational waves hit the first antenna and then the other, helping prove that the gravitational waves existed, company officials said. When the announcement was made, confirming that the company's circuit board had succeeded in its mission, "there was definitely a little sense of pride around here," said Dominick Carbone, marketing manager for the company. "This is a testament to our name, being Reliance, in that our [circuit] boards are very reliable."

The company was started by Patel in 1998 and has grown steadily, manufacturing short-run custom-designed electronic circuits and other equipment in batches of up to several hundred pieces that are too small to be worth making overseas. The company has 30 employees, and a string of customers including several that order the equipment for use in defense contracts, among them Picatinny Arsenal in Rockaway Township.

Company products include circuits used in sound-system mixing boards, X-ray machines and other devices, and a custom-made system that enables churches to use flickering electric lights, instead of candles, that turn on automatically when a congregant makes a donation.

Reliance was approached by Columbia in 2009 and worked for three years producing about five revisions of the board as scientists at the university tested each and refined the design. The entire job cost no more than \$100,000, said company officials, who declined to give an exact figure.



STAFF PHOTOS BY MICHAEL KARAS

Reliance Electronics chief engineer John Petrucelli, right, with company founder Peter Patel, center.

John Petrucelli, chief engineer at the company, said there was a sense of disbelief when they were asked by Columbia scientists to create a device that would detect gravitational waves.

"I remember when they first came in and told me what to do, I said: 'That [the gravitational wave] doesn't exist! You are never going to find that' — joking around with them," Petrucelli said. "It was like — 'Well, good luck!' But they found it."

The final version of the circuit was completed in 2012, and company executives heard nothing more about the project until they read news reports on the announcement by the scientists — including one from Columbia — that they had successfully detected the gravitational waves.

A Feb. 14 email from Zsuzsanna Marka, a scientist in the Columbia University team that worked on the gravitational waves project, thanked the company for its help and said the discovery was made only due to recent technological advances. Marka could not be reached for comment.

"Technological advances on all fronts were needed to reach this milestone, and open the new era of gravitational wave astronomy, which will undoubtedly bring more insight to our understanding of the cosmos and its previously hidden processes," she said.

This article contains material from The Associated Press.



A Reliance circuit board of the type used to measure the gravitational waves recently found in space.

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