Astronomers detect gravitational waves from observable neutron star collision, 130 million light years away

Over a billion light years away from our planet, black holes collide in a bear-hug that shakes the universe. Literally. Astronomers have detected the gravitational waves from such collisions three times since the year 2015, most recently this past August. However, it remained difficult to study the source of these waves (what exactly caused this ripple effect to race across space) because they produced no light, originating from dying stars in a galaxy far, far away. So the search began for a different kind of cosmic collision that produced both light *and* waves.

National Geographic describes neutron stars as dead stars whose cores exploded into supernovae before collapsing in on themselves, pulling up to 1.5 times the mass of our galaxy's sun into the center of the star. Once in this state, the neutron begins to spin faster and faster, often in a spiral path. When two of these neutrons collide, they produce bursts of gamma-ray light, which have the potential to be trillions of times brighter than the sun, thereby allowing these distant cosmic interactions to be visible from earth.

According to an article released by the Atlantic on Oct. 16, astronomers working together around the globe on Aug. 17 detected a mighty union between stars. First, gravitational-wave detectors picked up the incoming ripple of waves from across the universe. A few seconds later, two telescopes happened to capture a short flash of gamma-ray beams coming from the same direction as the gravitational waves. Within a few short hours, scientists discovered the exact location of the collision, which took place over 130 million light years away from Earth, using a telescope that detects infrared wavelengths of light. Over the course of the next few days, various teams of astronomers in countries such as the United States, Italy and Chile observed the progression of light as it dimmed and even changed color. The bright pulsing from day one indicated that massive amounts of radioactive mass were being pushed out from the cores of the newly-merged neutrons. By the time several days had passed, the collision's luster had begun to fade, leading astronomers to conclude that the incredibly hot burst of energy was finally cooling down.

The Atlantic also reported that this discovery serves as valuable evidence for theories that have circled through the realm of astronomy research. Scientists hypothesize that the presence of gamma-rays streaming from the collision indicated a kilonova — a cosmic explosion up to 1,000 times brighter than a standard supernova. The large amounts of mass within a neutron's core lead astronomers to speculate about the possible existence of elements even heavier than gold, iron and platinum.

New knowledge of these cosmic collisions creates a huge stepping stone in our still-limited understanding of how gravitational waves interact with light. As astronomers continue to study the universe, one can only wonder how much more we have yet to discover.