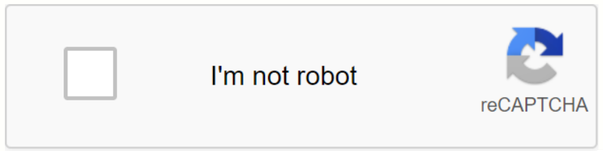

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Cosmic crash 2019

Image copyrightLIGO-VIRGO Collaboration Image captionAn artist's impression of the final moments before the merger of two black holeslic energy eight Suns released in an instant. This is the gravitational shockwave that spread from the largest fusion yet observed between two black holes. The signal from this event traveled for about seven billion years to reach Earth, but was still sufficiently strong to rattle laser detectors in the United States and Italy last May. Researchers say that colliding black holes produced a single device with a mass of 142 times that of our Sun.This is remarkable. Science has long tracked the presence of black holes in the sky, which are a lot smaller or even much larger. But this new observation inaugurates a new class of so-called medium-sized black holes in the range of 100-1,000 Sun (or sun) masses. The analysis is the latest to emerge from the international LIGO-VIRGO that operates three supersensitive gravitational wave detection systems in America and Europe.media captionSimulation: The black hole collision produced a train of gravitational wavesA black hole is a region of space where the matter has collapsed in itselfTryty features are so strong that nothing, not even light, can escapeBlack holes will come out of the explosive death of certain big starsBut some are really gigantic and are billions of times the mass of our SunHow these monsters – found on galaxy centers – formed are unknown Black holes are discovered from the way they affect their surroundingsThey produce observable gravitational waves as they spiral into each otherCondenceed laser interferometer instruments listen for vibrations in space-time that are generated by truly catastrophic cosmic events – and on May 21, 2019 they were all triggered by a sharp signal That lasted only a tenth of a second.Computer algorithms determined the source to be the final stage for two in-spiral black holes - one with a mass of 66 times our Sun and the other with 85 solar masses. The distance to the merger was estimated to be equivalent to 150 billion km. It's amazing, really, said Prof. Nelson Christensen of the Côte d'Azur Observatory in France. This signal propagated for seven billion years. So this event happened 'just before half-time' for the universe, and now it has mechanically moved our detectors here on Earth, he explained to BBC News.image copyrightLIGO-VIRGO Collaborationimage captionThe European VIRGO laser lab based in Italy's province of PisaGravitational waves is a prediction of the general theory of relativityIt took decades to develop the technology to directly detect themThey are ripples in the fabric of space-time generated by violent eventors will produce waves that propagates at the rate lightDetectable sources include merging black holes and neutron starsLIGO-VIRGO fire lasers into long, L-shaped tunnels; The waves disrupting the lightDetecting the waves opening the universe to brand new studiesInvolvering of an 85-sun mass object in the collision has made collaborative scientists sit up because their understanding of how black holes form from the death of a star can't really account for anything on this scale. Stars, when they exhaust their nuclear fuel, will experience an explosive core collapse to produce a black hole - if they are sufficiently large. But the physics that is assumed to operate inside stars suggest the production of black holes in the particular mass range between 65 and 120 solar masses is impossible. Dying stars that can provide such devices actually tear themselves apart and leave something behind. If the science is correct at this point then the most likely explanation for the existence of an 85-sun-mass object is that it itself was the result of an even earlier black hole union. And that, believes Professor Martin Hendry, from Glasgow University, UK, has implications for how the universe evolved. We are talking here about a hierarchy of mergers, a possible path to making bigger and bigger black holes, he said. So, who knows? This black hole of 142 solar masses may have been merged with other very massive black holes - as part of a process that goes all the way to the supermassive black holes that we believe are the core of galaxies. image copyrightLIGO-VIRGOimage captionThe discovery suggests that there is a hierarchy of mergers leading to ever larger black holesSeGS LIGO-VIRGO collaboration reports on May 21, 2019, event (cataloged as GW190521) in two scientific papers. One is in the journal Physical Review Letters and describes the discovery. The second can be found in The Astrophysical Journal Letters, and discusses the physical properties and scientific implications of the signal. GW190521 is one of over 50 gravitational wave triggers currently being studied in laser labs. The pace of research has increased rapidly since the collaboration made its first, Nobel Prize-winning demonstration of gravitational waves in 2015. We increase the sensitivity of the detectors, and yes, we may end up doing more than one detection a day. We want a rain of black holes! But it is beautiful because we will learn so much more about them, Prof Alessandra Buonanno, director at the Max Planck Institute for Gravitational Physics in Potsdam, told BBC News.A laser is fed into the machine and its beam is divided along two pathsIt separate paths bounce back and forth between muffled mirrors Eventually, the two light parts are recombined and sent to a detectorGravitational waves passing through the lab should interfere with the set-upTheory they hold they should very subtly stretch and squeeze spaceThis should show up as a change in the length of the bright armsPhoto detector picks up this signal in the recombined beamimage captionThe laser labs are constantly being upgraded to improve their sensitivityGravitational wavesBlack holesPhysicsAstrophysics The Large Magellanic Cloud, a satellite galaxy of the Milky Way, is about 200,000 light years from Earth. It could eventually collide with our galaxy, say astrophysicists. ESA/NASA/Hubble Day to Day here on Earth, our biggest threat from space is probably some undiscovered asteroid smashing into us, but astrophysicists are looking at the universe on a much larger scale warning that another kind of collision could also affect our planet in the distant future. A team led by researchers from the UK's Durham University says the threat of another galaxy colliding with the Milky Way could happen much faster than previously thought, and could send our entire solar system hurtling off in a new direction. There is a small chance that we cannot escape unscathed from the collision between the two galaxies, which could knock us out of the Milky Way and into interstellar space, Marius Cautun, a postdoc fellow at Durham's Institute for Computational Cosmology, said in a statement. Cautun is the lead author of a paper published Friday in the journal Monthly Notices of the Royal Astronomical Society.Fortunately for us, and probably for everything and everyone we'll ever know, this collision between the Milky Way and the smaller galaxy known as the Large Magellanic Cloud (LMC) probably won't happen for 2 billion years. But it's still much faster than the previously predicted effect with our neighbor Andromeda galaxy set to happen in 8 billion years. See all images +26 More While 2 billion years is an extremely long time compared to a human's lifespan, it's a very short time on cosmic timescales, Cautun said. LMC is one of a group of smaller satellite galaxies that actually orbit the Milky Way. New calculations suggest that it has twice as much dark matter as previously thought, and that all of the previously undiscovered mass may mean that it is diminishing and will be able to escape the gravitational pull of the Milky Way.Scientists say the collision could also wake up the Milky Way's sleeping black hole, which would immediately start feeding on nearby gas and grow in size by a magnitude. Barring any disasters, like a major disturbance of the solar system, our descendants, if any, are in for a treat: a spectacular display of cosmic fireworks as the newly awakened supermassive black hole at the center of our galaxy responds by emitting rays of extremely bright energetic radiation, said co-author and Durham professor Carlos Frenk. Fortunately, the screaming gala will be far enough away that it is unlikely to affect life on Earth. as Frenk points out, we cannot around to see it if the first collision throws us beyond the boundaries of the Milky Way. 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