Scientists in Japan may have discovered secret to the universe's 'missing mass'

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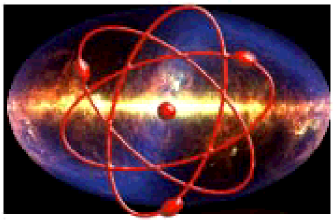
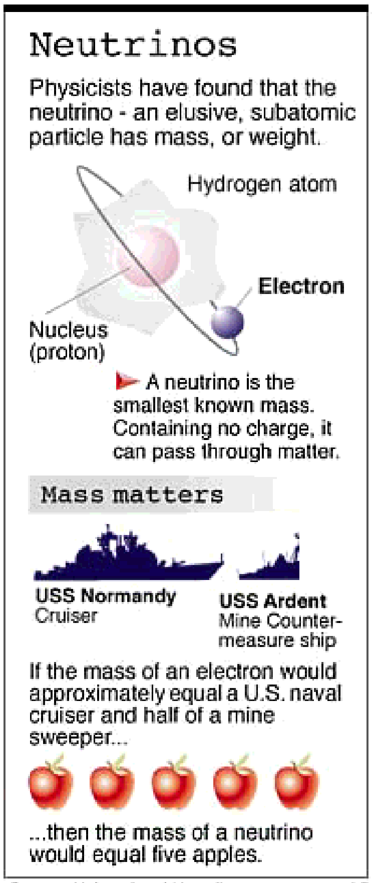


TOKYO (CNN) -- An international team of scientists working from a revamped mineshaft in central Japan said Friday they may have unlocked one of the biggest mysteries of physics -- evidence that an infinitesimally small subatomic particle called the neutrino has mass.

The finding would be revolutionary because it would force physicists to rethink a central theory of modern science: That the universe began expanding at the Big Bang and will keep expanding forever.

The Super-Kamiokande Experiment research team, a group of 120 scientists from around the world, presented their findings Friday at a physics conference in Takayama, a city in central Japan.

Art McDonald, a scientist at the



Source: University of Hawaii AP

Art McDonald, a scientist at the Sudbury Neutrino Observatory in Canada says, "because there are so many of them, if they have even a tiny mass, then they can influence the future expansion of out universe and tell us about whether our universe will continue to expand forever or whether our universe will eventually collapse back on itself."

The elusive neutrinos come from nuclear reactions inside stars or when cosmic rays collide with our atmosphere. Millions of them pass through the Earth everyday. The mass of an individual neutrino is thought to be perhaps a billion times less than an electron, the particle with the smallest known mass.

They are the basic building blocks of atoms, and, in turn, everything else. Since they have no charge, they are able to pass through matter and are extremely difficult to track.

Physics' "standard model" theory of how fundamental particles work seems to indicate that neutrinos have no weight at all, but the scientists in Japan say they have discovered something about neutrinos that proves part of the theory needs to be reconsidered.

They say they have found that some neutrinos oscillate, or change type as they pass through space or matter. A widely accepted theory of physics states that anything that oscillates must have mass.

The group of scientists working in Japan detected the neutrinos by using a 50,000 ton tank filled with highly purified water down a mine shaft a half-mile deep. The tank is surrounded by 13,000 photomultiplier tubes that detect the faintest flash of light. The tank was buried to avoid cosmic rays and radiation.

Neutrinos are produced by nuclear fusion in the sun's core and then hurled toward earth at the speed of light. The scientists hoped at least a few of the trillions of particles that pass through Earth every day would pass through their tank, setting off a detectable flash of light when they collided with an atom.

The team in Japan collected data for a year and will likely have to wait until another laboratory repeats their experiments before their conclusions become accepted as scientific fact. The Sudbury Neutrino Observatory is conducting similar tests.

CNN Correspondent Ann Kellan and The Associated Press contributed to this report.

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