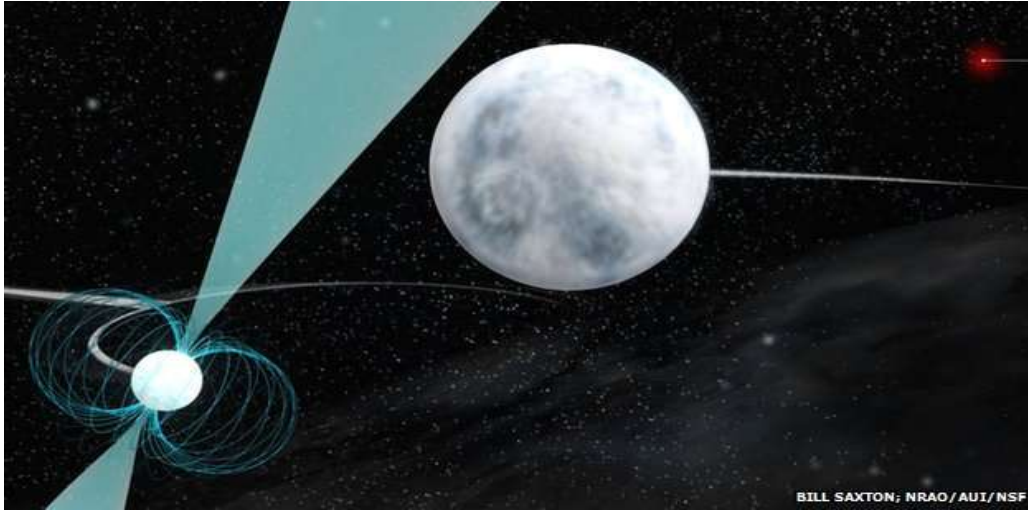


TRIPLE STAR SYSTEM PAVES ROAD TO UNDERSTANDING GRAVITY



Triple star systems could play a more important role than we first thought. <http://www.bbc.co.uk/>

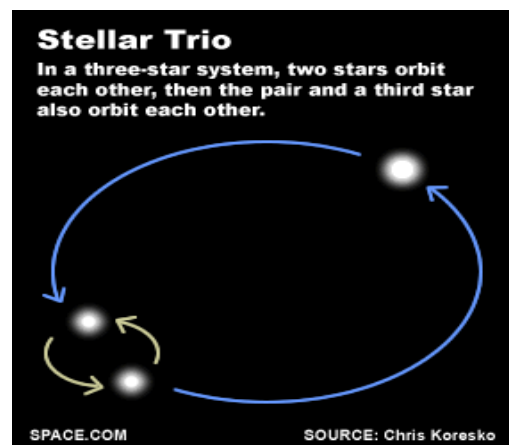
A new study published in the scientific journal *Nature* documents the discovery of a very peculiar triple star system. Astronomers believe that observation and analysis of this triple star system could potentially resolve lingering discrepancies in some of Einstein's theories concerning gravity. In fact, this particular triple star system could eventually lead to unraveling the secrets of gravity.

This triple star system is roughly 4200 light years from Earth and is composed of a pulsar and two white dwarfs orbiting each other within a space smaller than Earth's orbit of the sun. The pulsar closely orbits a white dwarf star while a second white dwarf star orbits the pair from a distance.

While a triple star system like this one has been found before, this is the first time such a strong interaction between the orbiting objects has been observed.

According to Scott Ransom of the US National Radio Astronomy Observatory (NRAO) in Charlottesville, VA:

This triple star system gives us a natural cosmic laboratory far better than anything found before for learning exactly how such three-body systems work and potentially for detecting problems with general relativity that physicists expect to see under extreme conditions. This is a fascinating system in many ways, including what must have been a completely crazy formation history, and we have much work to do to fully understand it.



An easy way to imagine a stellar trio. www.miqel.com

Pulsars are created in the presence of a supernova. Under the intensity of a supernova, burnt out stars can collapse and turn into a dense, highly magnetized ball of neutrons. A pulsar emits radio-waves in the same way a lighthouse emits light.

Pulsars can only be seen when the beam of radio waves is pointing at the Earth.

While pulsars all spin at different rates, the pulsar in the study spins at an extremely rapid rate of 366 times per second. Due to its incredible rotation speed, this type of pulsar is called a millisecond pulsar. Finding this millisecond pulsar triple star system is important because

This is the first millisecond pulsar found in such a system, and we immediately recognized that it provides us with a tremendous opportunity to study both the effects and nature of gravity. The gravitational perturbations imposed on each member of this system by the others are incredibly pure and strong.

Binary and triple star systems appear all over the galaxy. Even our sun is likely part of a larger binary solar system. While the systems can vary in formation, most are formed in a very similar fashion to the triple stellar system described in the study. Two of the stars form a binary system and the third star orbits the pair at a far greater orbit. If the system isn't constructed this way it becomes unstable, leading to a star being ejected at high velocities away from the pair.

So as is usual with cosmological physics, the hardest aspect of reading any study is figuring out why we should care about the discovery of a special triple star system.

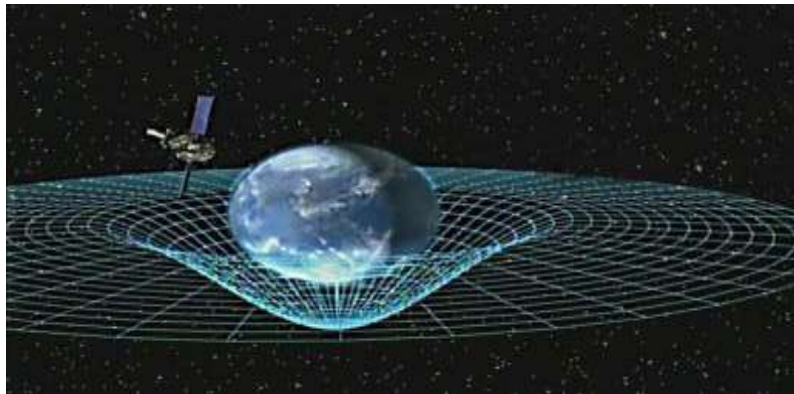
The thing is, gravity is a rascal when it comes to theories of the universe. It simply doesn't fit into any modern quantum theories.

The Einstein Equivalence Principle states:

The outcome of any local non-gravitational experiment in a freely falling laboratory is independent of the velocity of the laboratory and its location in spacetime.

This eventually led to the Strong Equivalence Principle, which states:

The gravitational motion of a small test body depends only on its initial position in spacetime and velocity, and not on its constitution. The outcome of any local experiment (gravitational or not) in a freely falling laboratory is independent of the velocity of the laboratory and its location in spacetime.



Gravity is stranger than you think. <http://podaac.jpl.nasa.gov/>

The equivalence principle holds true in most experiments, but in the quantum world it completely falls apart. Einstein's theory of general relativity holds true for massive celestial bodies, but the miniscule world of quantum physics is a different realm entirely.

Countless attempts have been made to create a Grand Unified Theory of physics involving a single equation that would involve all forces currently known to man. The problem is that gravity constantly throws a wrench in the spokes of every unified theory physicists come up with. Simply put, the reason this study of a unique triple star system is so important is that by observing the activity of a triple system with such pure and strong gravitational interactions, it may shine light on how gravity functions at the quantum level. This could one day lead to a single unified theory of everything. Physics would no longer be a class, just a single equation you could plug and chug information into and get answers.

Source: <http://wondergressive.com/triple-star-system-new-gravity/>