Is it possible to prove the existence of gravitons?

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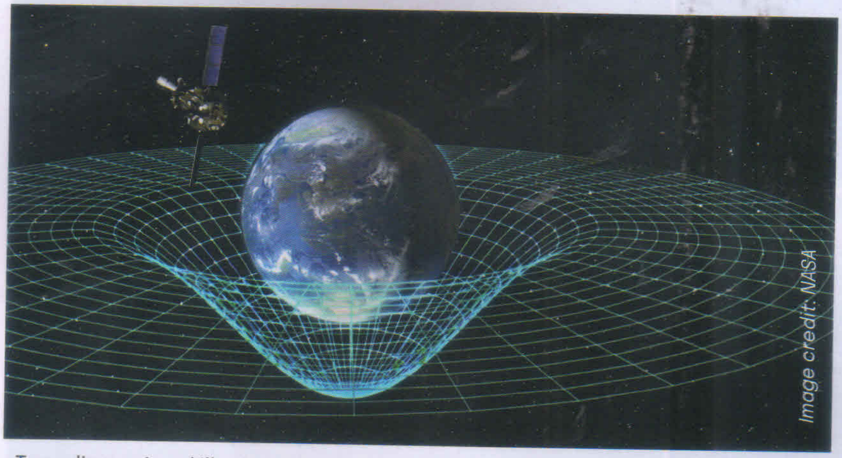

Two-dimensional illustration of how mass in the Universe distorts space-time

MOST of the time, the answer to a title that ends with a question mark is "no". Ian Betteridge, a British journalist, wrote about this. People now call this the "Bettaridge Policy." Based on this rule, the answer to the headline of this article will very certainly be "no". But first, let's take a closer look.

A graviton is a hypothetical particle in physics that is thought to carry gravity. We still don't have any experimental proof that gravitons exist. Scientists have already found out what this particle is like, though. They say that gravitons are tiny particles that don't have mass or charge. Physicists say that gravitation is the force that pulls two things together when gravitons jump from one to the other. Because of this, the two items draw closer to each other. That is why it is a particle that carries gravitational force. This particle carries the force of gravity from one object to another. The issue comes up: why do physicists think gravitons exist when there is no tangible or scientific proof of them?

To find the answer, we need to understand the most reliable theory of gravity and some important aspects of modern quantum theory. Let's begin.

Sir Isaac Newton came up with the first mathematical theory of gravity. This happened in the year 1680. His idea of gravity and the calculations he came up with were pretty precise. That's why people still use them now to figure out where spacecraft will go. There were a number of issues with Newton's theory. What exactly does Newton's equation say about gravity, and why does it say that? It doesn't say anything; it only evaluates the magnitude of force. The equation just indicates that big or heavy things are drawn to one another in some way. Newton's equation can be used to figure out exactly how much attraction there is.

Things changed at the start of the 20th century. Albert Einstein published his general theory of relativity in 1915. It is still thought to be the best explanation of gravity. The theory of general relativity says that heavy things bend space and time, which is what causes gravity. This means that space and time bend around a heavy object. And other small things nearby have to move about. For instance, the Sun, which is the heaviest object in our solar system, spins spacetime around it. The sun is what makes all the planets and other things move.

Einstein's general relativity applies to more than just the solar system; it also applies to other big objects in the cosmos. The notion has been tested in many different things that happen in the cosmos. And the statement has been shown to be true in practically every case. In truth, general relativity is a robust theory of the universe as a whole. But it doesn't work in the microscopic world, like with atoms and electrons. Therefore, quantum theory does a great job of explaining the extremely small world. Even general relativity acts strangely when it arrives to the singularity, which is the point of the big bang or black hole. The results are incorrect. We can no longer trust this theory. Physicists believe that a new theory is necessary to provide an exact explanation for concepts such as an absolute point. Quantum gravity is the name of the theory that would combine quantum theory and general relativity. Many people call it the theory of everything.

Quantum field theories often require superatomic particles to interact or carry forces. Some individuals realise that quantum theory has integrated three of the four fundamental forces of the universe. This is the Standard Model. Electromagnetic, strong, and weak nuclear forces unite. The explanation for these forces is quantum field theory. The Standard Model describes 17 basic particles. Fermions (quarks and leptons), bosons (photons, gluons, and W and Z bosons), and one Higgs boson (particle mass) are included. The typical model performs well experimentally. Gravity cannot yet be reconciled with these three fundamental forces. Gravity differs from the other forces. Therefore, it does not fit into the same theoretical framework as other forces. No one knows why. It remains a mystery within the universe.

Quantum field theories commonly require one or more superatomic particles to interact or carry the force. For example, the carrier of an electromagnetic force is known as a photon. This force is delivered through the exchange