

ASTRONOMY

Mysterious neutron stars might yield clues to universe

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Orion is one of the most recognized constellations. Near to Orion's "belt" is a nebula, which is easily missed unless you have a clear, dark night for viewing. It shows up as a diffuse patch of light, bigger than the moon, but much fainter.

As a child, I remember looking at beautiful color pictures of nebulae, fascinated that such things exist among the stars.

Many nebulae are the remnants of supernova explosions. These events are quite rare. In our galaxy, a supernova explosion happens only once every few centuries.

To explode, a star must be much larger than our sun and also near the end of its lifetime. When it explodes, the supernova gives off more light than all the stars in the galaxy for a short time. After the explosion, the remnants of the star are ejected outward, leaving an expanding cloud of dust that we see as a nebula.

Inside some nebula is a mysterious object that you can't see with your eyes, even with a telescope. Called a neutron star, it is one of the strangest objects in the sky. It forms in the core of a supernova, when ordinary matter is squeezed so hard that the atoms collapse. Atoms merge with their neighbors, forming a compact object made mostly of neutrons.

The neutron star is, simply put, a nucleus the size of a small city. A teaspoon of the stuff has more mass than all the buildings in New York City. Packed into a sphere about 8 miles in diameter, the neutron star weighs more than 200,000 times as much as Earth.

Neutron stars give off short pulses of radio waves, and this is how astronomers detect them. Years ago, they were simply called pulsars. Recently, a double pulsar was discovered, from two neutron stars orbiting each other in a never-ending dance. Using this new signal, scientists can discover more about the behavior of neutron stars.

Along with astronomers, nuclear physicists are interested in neutron stars because the objects tell them more about the forces inside the nucleus. For example, is the nucleus of an atom soft and compressible or hard and stiff? The answer is not known precisely. It's funny that studying neutron stars in the sky will help us understand more about the stuff of matter on Earth.

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