

Celestial bauble intrigues astronomers

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Credits: NASA/CXC/Univ. of Potsdam/L. Oskinova et al.

(PhysOrg.com) -- With the holiday season in full swing, a new image from an assembly of telescopes has revealed an unusual cosmic ornament. Data from NASA's Chandra X-ray Observatory and ESA's XMM-Newton have been combined to discover a young pulsar in the remains of a supernova located in the Small Magellanic Cloud, or SMC. This would be the first definite time a pulsar, a spinning, ultra-dense star, has been found in a supernova remnant in the SMC, a small satellite galaxy to the Milky Way.

In this [composite image](#), X-rays from Chandra and XMM-Newton have been colored blue and optical data from the Cerro Tololo Inter-American Observatory in Chile are colored red and green. The [pulsar](#), known as SXP 1062, is the bright white source located on the right-hand side of the image in the middle of the diffuse blue emission inside a red shell. The diffuse X-rays and optical shell are both evidence for a supernova remnant

surrounding the pulsar. The optical data also displays spectacular formations of gas and dust in a star-forming region on the left side of the image. A comparison of the Chandra image with [optical images](#) shows that the pulsar has a hot, massive companion.

Astronomers are interested in SXP 1062 because the Chandra and XMM-Newton data show that it is rotating unusually slowly -- about once every 18 minutes. (In contrast, some pulsars are found to revolve multiple times per second, including most newly born pulsars.) This relatively leisurely pace of SXP 1062 makes it one of the slowest rotating X-ray pulsars in the SMC.

Two different teams of scientists have estimated that the supernova remnant around SXP 1062 is between 10,000 and 40,000 years old, as it appears in the image. This means that the pulsar is very young, from an astronomical perspective, since it was presumably formed in the same explosion that produced the supernova remnant. Therefore, assuming that it was born with rapid spin, it is a mystery why SXP 1062 has been able to slow down by so much, so quickly. Work has already begun on theoretical models to understand the evolution of this unusual object.

Provided by JPL/NASA

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