

A surprisingly bright superbubble

August 30 2012



The star cluster NGC 1929 contains massive stars that produce intense radiation, expel matter at high speeds, and race through their evolution to explode as supernovas. The winds and shock waves carve out huge cavities called superbubbles in the surrounding gas. X-rays from Chandra (blue) in this composite image reveal the regions created by these winds and shocks, while infrared data from Spitzer (red) outline where the dust and cooler gas are found. Optical light from an ESO telescope in Chile (yellow) shows where ultraviolet radiation from the young stars is causing the gas to glow. Credit: X-ray: NASA/CXC/U.Mich./S.Oey, IR: NASA/JPL, Optical: ESO/WFI/2.2-m

(Phys.org)—This composite image shows a superbubble in the Large Magellanic Cloud (LMC), a small satellite galaxy of the Milky Way located about 160,000 light years from Earth.

Many new stars, some of them very massive, are forming in the star cluster NGC 1929, which is embedded in the nebula N44, so named because it is the 44th nebula in a catalog of such objects in the Magellanic Clouds. The massive stars produce [intense radiation](#), expel matter at high speeds, and race through their evolution to explode as supernovas. The winds and supernova shock waves carve out huge cavities called superbubbles in the surrounding gas.

X-rays from NASA's Chandra X-ray Observatory (blue) show hot regions created by these winds and shocks, while infrared data from NASA's [Spitzer Space Telescope](#) (red) outline where the dust and cooler gas are found. The optical light from the 2.2-m Max-Planck-ESO telescope (yellow) in Chile shows where [ultraviolet radiation](#) from hot, young stars is causing gas in the nebula to glow.

A long-running problem in high-energy astrophysics has been that some superbubbles in the LMC, including N44, give off a lot more X-rays than expected from models of their structure. These models assume that hot, X-ray emitting gas has been produced by winds from massive stars and the remains of several supernovas. A Chandra study published in 2011 showed that there are two extra sources of N44's X-ray emission not included in these models: supernova [shock waves](#) striking the walls of the cavities, and hot material evaporating from the cavity walls.

The Chandra observations also show no evidence for an enhancement of elements heavier than hydrogen and helium in the cavities, thus ruling out this possibility as a third explanation for the bright X-ray emission. Only with long observations making full use of the capabilities of Chandra has it now become possible to distinguish between different

sources of the X-rays produced by superbubbles.

The Chandra study of N44 and another superbubble in the LMC was led by Anne Jaskot from the University of Michigan in Ann Arbor. The co-authors were Dave Strickland from Johns Hopkins University in Baltimore, MD, Sally Oey from University of Michigan, You-Hua Chu from University of Illinois and Guillermo Garcia-Segura from Instituto de Astronomia-UNAM in Ensenada, Mexico.

Provided by Chandra X-ray Center

Citation: A surprisingly bright superbubble (2012, August 30) retrieved 26 June 2024 from <https://phys.org/news/2012-08-surprisingly-bright-superbubble.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.