A celestial witch's broom?—A new view of the pencil nebula

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The oddly shaped Pencil Nebula (NGC 2736) is pictured in this image from ESO's La Silla Observatory in Chile. This nebula is a small part of a huge remnant left over after a supernova explosion that took place about 11 000 years ago. The image was produced by the Wide Field Imager on the MPG/ESO

2.2-meter telescope at ESO?s La Silla Observatory in Chile. Credit: ESO

(Phys.org)—The Pencil Nebula is pictured in a new image from ESO's La Silla Observatory in Chile. This peculiar cloud of glowing gas is part of a huge ring of wreckage left over after a supernova explosion that took place about 11 000 years ago. This detailed view was produced by the Wide Field Imager on the MPG/ESO 2.2-metre telescope.

Despite the tranquil and apparently unchanging beauty of a starry night, the Universe is far from being a quiet place. Stars are being born and dying in an endless cycle, and sometimes the death of a star can create a vista of unequalled beauty as material is blasted out into space to form strange structures in the sky.

This image of the region of sky around the Pencil Nebula shows a spectacular celestial landscape featuring the blue filaments of the Vela supernova remnant,

the red glow of clouds of hydrogen and countless stars. It is a colour composite made from exposures from the Digitized Sky Survey 2. Credit: ESO/Digitized Sky Survey 2 Acknowledgment: Davide De Martin.

This new image from the Wide Field Imager on the MPG/ESO 2.2-metre telescope at ESO's La Silla Observatory in Chile shows the Pencil Nebula against a rich starry background. This oddly shaped cloud, which is also known as NGC 2736, is a small part of a supernova remnant in the southern constellation of Vela (The Sails). These glowing filaments were created by the violent death of a star that took place about 11 000 years ago. The brightest part resembles a pencil; hence the name, but the whole structure looks rather more like a traditional witch's broom.

The Vela supernova remnant is an expanding shell of gas that originated from the supernova explosion. Initially the shock wave was moving at millions of kilometres per hour, but as it expanded through space it ploughed through the gas between the stars, which has slowed it considerably and created strangely shaped folds of nebulosity. The Pencil Nebula is the brightest part of this huge shell.

This new image shows large, wispy filamentary structures, smaller bright knots of gas and patches of diffuse gas. The nebula's luminous appearance comes from dense gas regions that have been struck by the supernova shock wave. As the shock wave travels through space, it rams into the interstellar material. At first, the gas was heated to millions of degrees, but it then subsequently cooled down and is still giving off the faint glow that was captured in the new image.

By looking at the different colours of the nebula, astronomers have been able to map the temperature of the gas. Some regions are still so hot that

the emission is dominated by ionised oxygen atoms, which glow blue in the picture. Other cooler regions are seen glowing red, due to emission from hydrogen.

The Pencil Nebula measures about 0.75 light-years across and is moving through the interstellar medium at about 650 000 kilometres per hour. Remarkably, even at its distance of approximately 800 light-years from Earth, this means that it will noticeably change its position relative to the background stars within a human lifetime. Even after 11 000 years the supernova explosion is still changing the face of the night sky.

Provided by ESO