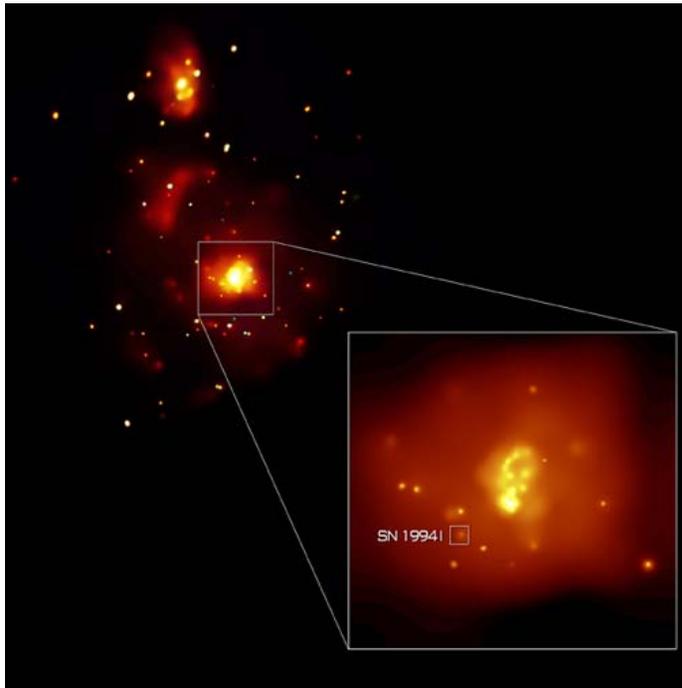




Chandra Science Highlights

WHIRLPOOL GALAXY M51: NGC 5194 & NGC 5195

HIGH-ENERGY ACTIVITY HEATS UP THE WHIRLPOOL



Chandra's image highlights the energetic central regions of the two interacting galaxies, NGC 5194 (center) and its smaller companion NGC 5195 (upper left), that are collectively called the Whirlpool Galaxy. The inset contains an expanded image of the central region of NGC 5194. Extending to the north and south of the bright nucleus are lobes of multimillion degree gas, with diameters of about 1500 light years and 500 light years, respectively. On the lower left of the inset image is a faint source identified with an unusual Type Ic supernova discovered in 1994. The image also shows a large number of point-like X-ray sources due to black holes and neutron stars in binary star systems.

References: S. Immler et al. *Astrophys. J. Letters*, 573, 27I (2002)
Y. Terashima & A. Wilson, *Astrophys. J.* 560, 139 (2001)

Credit: NASA/CXC/U.Md/A. Wilson et al.

Chandra ACIS Image.

- This is the first definitive detection of a Type Ic supernova. The massive stars responsible for these supernovas are thought to have lost their outer layers of hydrogen and helium gas thousands of years before the explosion, either through evaporation or transfer to a companion. The data from SN 1994I indicate that the pre-supernova star lost mass at a rate of $1E-5$ solar masses per year for about 10,000 years, creating a cloud of material around the star that has a diameter of at least 0.2 light years.
- The similarity of the hot lobes with ones observed at radio wavelengths suggests that the gas is heated by high-velocity jets produced near a supermassive black hole in the nucleus of the galaxy.