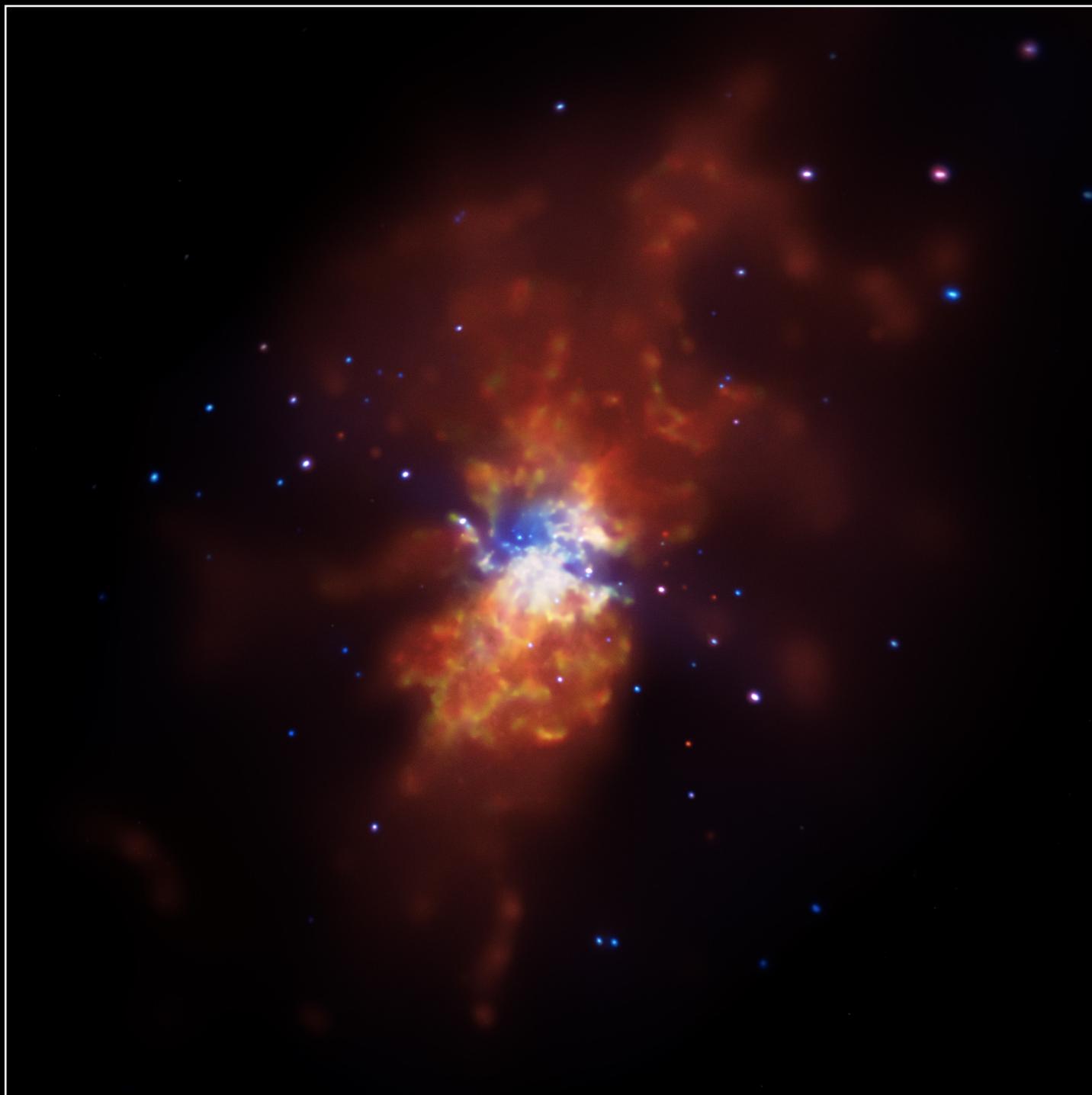




M82



M82: Chandra Images Torrent of Star Formation

M82 is a so-called starburst galaxy where stars are forming much more frequently than normal galaxies.

This deep Chandra image reveals hundreds of point-like X-ray sources, some of which likely contain black holes.

Supernova explosions have produced bubbles of hot gas that extend millions of light years away from the plane of the galaxy.

A Chandra X-ray Observatory image of Messier 82, or M82, shows the result of star formation on overdrive. M82 is located about 12 million light years from Earth and is the nearest place to us where the conditions are similar to those when the Universe was much younger with lots of stars forming.

M82 is a so-called starburst galaxy, where stars are forming at rates that are tens or even hundreds of times higher than in a normal galaxy. The burst of star birth may be caused by a close encounter or collision with another galaxy, which sends shock waves rushing through the galaxy. In the case of M82, astronomers think that a brush with its neighbor galaxy M81 millions of years ago set off this torrent of star formation.

M82 is seen nearly edge-on with its disk crossing from about 10 o'clock to about 4 o'clock in this image from Chandra (where low, medium, and high-energy X-rays are colored red, green, and blue respectively.) Among the 104

point-like X-ray sources in the image, eight so far have been observed to be very bright in X-rays and undergo clear changes in brightness over periods of weeks and years. This means they are excellent candidates to be black holes pulling material from companion stars that are much more massive than the Sun. Only a handful of such binary systems are known in the Local Group of galaxies containing the Milky Way and M31.

Chandra observations are also important in understanding the rapid rate at which supernovas explode in starburst galaxies like M82. When the shock waves travel through the galaxy, they push on giant clouds of gas and dust, which causes them to collapse and form massive stars. These stars, in turn, use up their fuel quickly and explode as supernovas. These supernovas produce expanding bubbles of multimillion-degree gas that extend for millions light years away from the galaxy's disk. These bubbles are seen as the large red areas to the upper right and lower left of the image.

NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, controls Chandra's science and flight operations.

CREDIT: NASA/CXC/Wesleyan/R.Kilgard et al.
RELEASED: January 13, 2011
SCALE: Image is about 12.75 arcmin across (about 44,500 light years)
COORDINATES (J2000): RA 09h 55m 50.70s
Dec +69° 40' 37.00"
CONSTELLATION: Ursa Major

OBSERVATION DATE: 7 pointings between 09/20/99 and 07/28/10
OBSERVATION TIME: 142 hours 47 min (5 days, 22 hours, 47 min)
COLOR CODE: Red 0.3-1.1 keV; Green 0.7-2.2 keV; Blue 2.2-6 keV
DISTANCE ESTIMATE: About 12 million light years