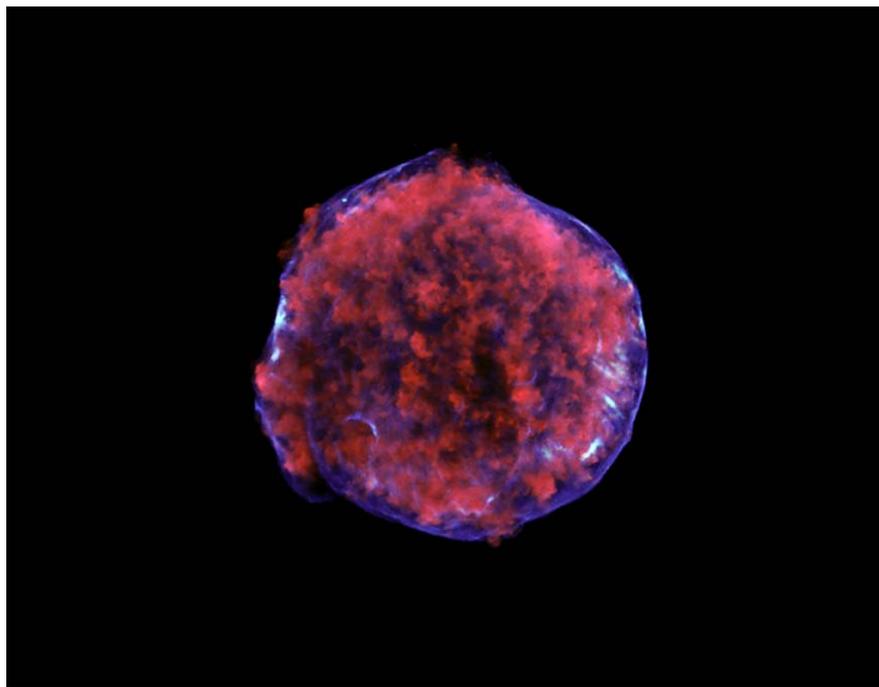




Chandra Science Highlight

Tycho's Supernova Remnant: Exploding Stars and Stripes



Chandra X-ray Observatory ACIS image
Scale: Image is 19 arc min across (about 55 light years)

Distance Estimate: 13,000 light years.

Credit: X-ray NASA/CXC/Rutgers/K. Eriksen et al

This image comes from a very deep Chandra observation of the Tycho supernova remnant. Low-energy X-rays (red) in the image show expanding debris from the supernova explosion and high energy X-rays (blue) show the blast wave, and a pattern of X-ray “stripes” (between about 3 and 5 o’clock on the right-hand edge of the remnant.).

- A long (a total of eight days and 15 hours with 9 observations) Chandra observation of Tycho has revealed a pattern of X-ray “stripes” never seen before in a supernova remnant.
- Assuming that the spacing between the X-ray stripes corresponds to the gyro radius of the highest energy protons in the supernova remnant, the spacing corresponds to energies ~ 1000 TeV, the highest energy cosmic rays thought to be produced in the Galaxy.
- Models of the particle acceleration and magnetic field amplification in supernova shock waves predict structure on the scale of the gyro radius of the highest energy particles present, but they do not predict the observed highly-ordered pattern.

Reference:

K.Eriksen et al. 2011, ApJL, 728:L28; arXiv:1101.1454