Chandra Science Highlight

Cassiopeia A: Chandra Discovers Evidence for Efficient Shock Acceleration of Cosmic Ray Electrons

The present study examined X-ray spectra for more than 10,000 regions of the shock wave.

These spectra were used to show that electrons are accelerated to extremely high energies at a rate near the maximum rate predicted by the diffusive shock acceleration theory. According to this theory electrons and ions are accelerated when they bounce back and forth across the shock front.

This discovery provides compelling evidence that supernova remnants are key sites for energizing charged particles, and may help to explain the acceleration of charged particles on scales ranging from the magnetosphere of Earth, to extragalactic jets thousands of light years in length.

Distance to Cas A: About 10 thousand light years.

Credit: NASA/CXC/MIT/UMass Amherst/M.D.Stage et al


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