NASA's Fermi Confirms Star Wreck as Source of Extreme Cosmic Particles

Astronomers have been hunting for sources of some of the highest-energy particles in our galaxy – protons that have a quadrillion times more energy than visible light. They've long suspected that the shock waves of exploded stars can boost these cosmic rays near light speeds.

Now, a study using 12 years of data from NASA's Fermi satellite confirms that one supernova remnant called G106.3+2.7 does just that. This particular star wreck is a comet-shaped cloud located about 2,600 light-years away in the constellation Cepheus. A bright pulsar (rotating neutron star) caps the northern end of the supernova remnant, and astronomers think both objects formed in the same explosion. Trapped by the incredibly strong and chaotic magnetic fields in the area, the particles repeatedly cross the supernova's shock wave, gaining speed and energy with each passage. Eventually, the remnant can no longer hold them, and they zip off into interstellar space.

Goddard manages the Fermi mission, and Fermi and other gamma-ray observatories may reveal more of these cosmic particle accelerators in the future.

www.nasa.gov/feature/goddard/2022/nasa-s-fermi-confirms-star-wreck-as-source-of-extreme-cosmic-particles

https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.129.071101

In this multiwavelength view of G106.3+2.7, radio emission from the remnant is blue and green. Yellow, orange, and red reveal radio waves from a vast cloud of interstellar gas. Pink shows where protons boosted by the supernova's shock wave, emitting a tell-tale glow of gamma rays. Credit: Jayanne English (University of Manitoba), NASA/Fermi/Fang et al. 2022, and Canadian Galactic Plane Survey/DRAO/FCRAO.