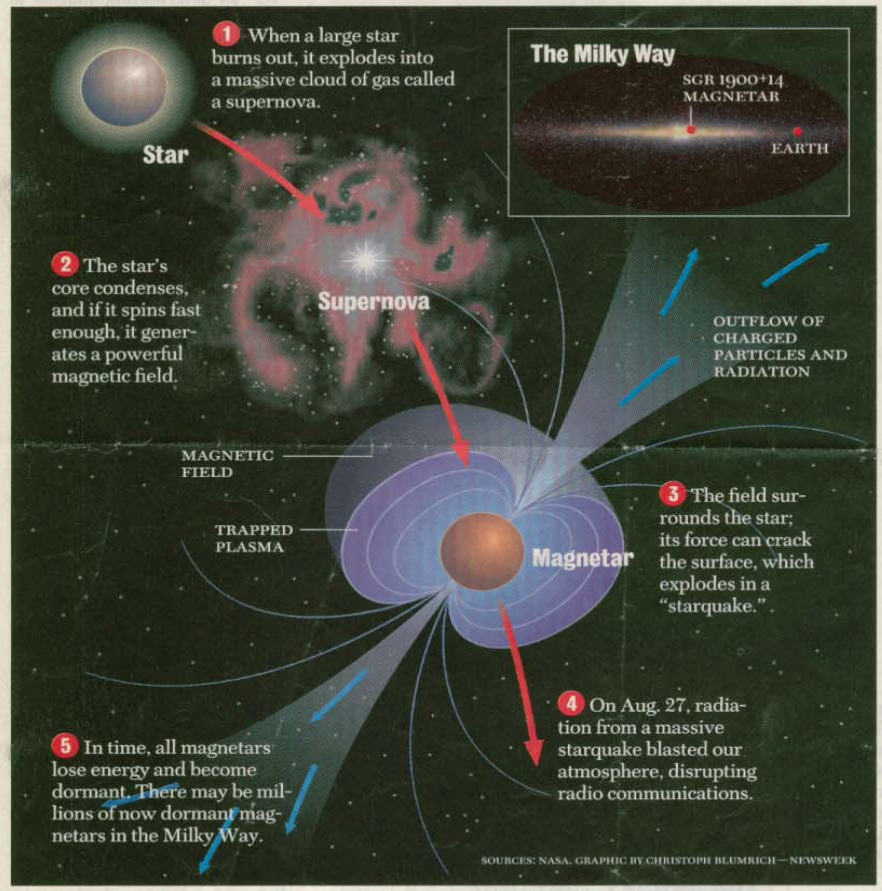
SCIENCE

Debut of a Mighty Magnetar

After a startling cosmic blast from 20,000 light-years away, astronomers introduce a strange new class of stars



BY THOMAS HAYDEN

THERE ISN'T ENOUGH AIR OUT ON THE fringes of our atmosphere to carry any sound, so the bombardment began silently. For five minutes on Aug. 27, starting at 2:22 a.m. Pacific time, a blast of deadly X-rays and gamma radiation blew through research satellites orbiting the Earth, overloading their sensors. It slammed into the upper atmosphere, sending electrons flying and disturbing long-range radio transmissions. Then, luckily for the rays dissipated harmlessly. An alien airstrike? No. The aggressor, scientists announced last week, was a magnetar—a bizarre new type of star discovered earlier this year—located some 20,000 light-years away in our own Milky Way galaxy.

Until recently, magnetars were just a theory. Some scientists laughed when astrophysicists Robert Duncan of UT Austin and Christopher Thompson of UNC Chapel Hill proposed the idea at a meeting in 1992. But the chuckles had all subsided by May of this year, when NASA astrophysicist Chryssa Kouveliotou and her colleagues published compelling evidence that magnetars exist. When that happened, says Kouveliotou, Thompson "went completely nonlinear" with joy. Now that the Aug. 27 magnetar, named SGR 1900+14, has shown its power, magnetars have finally earned their place in the cosmic bestiary.

Magnetars are balls of "nuclear ash" left over when giant stars, at least eight times as big as our sun, explode into supernovas (graphic). Although only 12 miles across, they contain more matter than the Sun, so they are incredibly dense—a teaspoonful would weigh about a billion tons on Earth. According to Duncan and Thompson's theory, a star becomes a magnetar, rather than a more benign pulsar, if its core is spinning fast enough—at least 200 revolutions per second—right after the supernova detonation. Like a car's solenoid, the whirling hot star generates a magnetic field. Before they eventually lose force (roughly 10,000 years), magnetars generate magnetic fields hundreds of times as powerful as any others in the universe. That force can periodically crack the star's solid metal crust, causing tremendous "starquakes." And it's those starquakes, shooting out streams of charged particles and radiation, that cause energy bursts like the one that hit Earth on Aug. 27.

That event was a particularly powerful one, probably the result of a massive readjustment of SGR 1900+14's magnetic field. Astronomers estimate the strength of that field to be 1 quadrillion Gauss, or 1 trillion times as strong as our sun's best effort. If the magnetar were between us and the moon, it would instantly erase every cassette tape, ATM card and hard drive on the planet. Much closer—don't worry, it's not going to happen—and the magnetic force wouldn't just tear the keys out of your pocket, it would probably rip the iron atoms right out of your blood.

Astronomers expect more data soon, from less powerful starquake aftershocks on SGR 1900+14, and from the other three suspected active magnetars in the galactic neighborhood. Fortunately, none of them is closer than SGR 1900+14, so your keys should still be right where you left them. ■