

Rare Flare

ODD MAGNETAR BURST PARTLY SOLVES GAMMA-RAY RIDDLE **BY GOVERT SCHILLING**

It was the brightest cosmic explosion ever observed, and astronomers are still hotly debating its origin and implications. But already the giant flare of December 27, 2004, produced by a bizarre star in our own Milky Way galaxy, is providing a partial solution to a 10-year-old astrophysical mystery. Such “magnetar” flares in distant galaxies may account for at least some of a particular class of gamma-ray burst that has defied explanation.

Despite its distance of 50,000 light-years, the December flare was brighter than the full moon. Yet no one actually saw it, because it belched out almost all its stupendous power in the form of energetic gamma rays, completely saturating the sensitive Burst Alert Telescope on NASA’s Swift satellite, which had been launched into orbit just five weeks earlier. “It was an astonishing event,” recalls gamma-ray-burst researcher

Ralph Wijers of the University of Amsterdam in the Netherlands.

After learning of the giant flare, Swift scientist David Palmer of Los Alamos National Laboratory immediately had a hunch. If a similar magnetar flare occurred in a distant galaxy, he reasoned, it would be indistinguishable from a so-called short gamma-ray burst, with a duration less than two seconds or so. These short bursts are quite different from their longer cousins, which last from a few seconds to many minutes. Astronomers believe that long gamma-ray bursts, all detected in remote galaxies so far, signal the catastrophic and terminal detonation of supermassive, rapidly spinning stars. This proposed mechanism probably does not apply to short gamma-ray bursts, however.

Palmer developed his idea and found that the magnetar flares offer at least a par-

APRETTY BIG BANG

The December 27, 2004, flare—the brightest blast ever observed—originated on a relatively nearby neutron star, a small, superdense stellar corpse. Called SGR 1806-20, it sports a magnetic field a quadrillion times as strong as Earth’s, potent enough to rob your car keys from your pocket if the star were as close as the moon. Most likely a star quake that suddenly reconfigured the star’s magnetic field set off the giant flare. What is more, it could happen again: the blast did not destroy the star.

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STAR WITH FLARE: Artist's conception of the December 2004 gamma-ray flare, the brightest burst ever seen, expanding from SGR 1806-20.

tial explanation. In an analysis to be published in *Nature*, he and his colleagues conclude that at least a few percent of all short bursts are quite likely to be explained in this way. Based on the observed luminosity and expected frequency of giant magnetar flares, a few dozen of these events per year would occur in other, relatively nearby galaxies. This amount is not enough to explain all short gamma-ray bursts, but, Palmer says,

“5 percent is a good approximation.” He quips that this number “is probably not off by more than a factor of 20, which is actually pretty good in this business.”

As for the cause of the other short gamma-ray bursts, Chryssa Kouveliotou of the NASA Marshall Space Flight Center says that the leading explanation is the violent merger of two neutron stars orbiting each other. But Palmer notes: “With the December 27 event, we now know that neutron-star mergers are not responsible for *all* short gamma-ray bursts. Whether they are responsible for *any* of them is still an open question.” Wijers agrees that it remains unclear whether a neutron-star merger can produce this type of gamma-ray burst.

The answer may come soon, though. Astronomers expect that the Swift satellite, which became fully operational in early April, will accurately pinpoint sky positions and distances for a number of short bursts, enabling scientists to finally get a grip on these enigmatic phenomena. Palmer, for one, is optimistic: “The next gamma-ray burst we see could bring enlightenment.”

Govert Schilling writes about astronomy from Amersfoort, the Netherlands.

NASA

HEALTH

Snoring Suspects

FREE RADICALS MAY SET OFF SLEEP APNEA'S CARDIO DANGERS BY LISA MELTON

Snororing is not just a recipe for marital discord; it can be life-threatening, too, when it is a part of sleep apnea. This disorder, in which breathing stops many times a night, can detonate dangerous cardiovascular stress. But scientists have long puzzled over why we should respond so fiercely to dips in the oxygen supply. Now a new study has identified the tissue and chemical changes that stir up the problem, a finding that could lead to novel drug treatments.

In North America as many as 24 percent of adults suffer from sleep-disordered breathing, a problem exacerbated by obesity. People with obstructive sleep apnea cease breathing for about 15 seconds, every few minutes, hundreds of times a night. Besides feeling drowsy and exhausted the next

day, people with sleep apnea face high blood pressure and risk heart attacks and stroke. Indeed, they are about three times as likely to die from a heart attack in the middle of the night as the general population, according to a study in the March 24 *New England Journal of Medicine*. “The consequences of this intermittent [oxygen deprivation], if it persists for years, can be very drastic,” says physiologist Nanduri R. Prabhakar of Case Western Reserve University.

Prabhakar has long been mystified by sleep



BAD SLEEP: Health dangers lurk in snoring.

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