

Black hole acts as cosmic 'Old Faithful'

Three teams of astronomers have linked fluctuations in X-ray emissions around a suspected black hole to bursts of infrared radiation from jets of hot matter that the object hurls out every 30 minutes. The regularity of these eruptions prompted the scientists to liken the bright X-ray source, known as GRS 1915+105, to Yellowstone National Park's Old Faithful geyser.

The link between the X-ray and infrared observations may shed light on the origin of these high-speed jets, which can be seen near many objects thought to be black holes. Astronomers from NASA's Goddard Space Flight Center in Greenbelt, Md., the California Institute of Technology in Pasadena, and the Massachusetts Institute of Technology announced their findings Jan. 7 at a meeting of the American Astronomical Society in Washington, D.C.

In 1994, researchers detected huge blobs of gas, moving at nearly the speed of light, that had been ejected from GRS 1915+105 (SN: 9/3/94, p. 150). Late last year, scientists again observed large amounts of material spewing from the suspected black hole, located about 40,000 light-years from Earth in the constellation Aquila (SN: 12/6/97, p. 357).

Teams from NASA and MIT monitored GRS 1915+105's X-ray emissions for 3 days in August 1997 and found a regular, pronounced dip in output for about 5 minutes of every 30-minute cycle. These fluctuations could occur either if the hot gas generating the X rays is swallowed by the candidate black hole or if the gas somehow escapes GRS 1915+105's intense gravitational field, says Jean H. Swank of NASA.

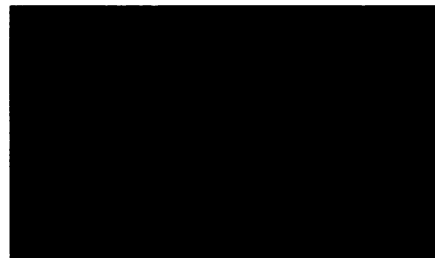
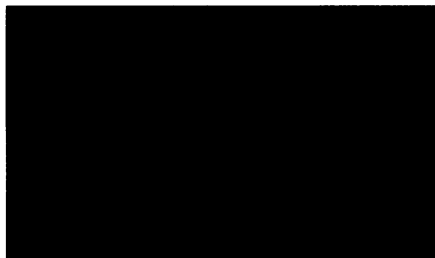
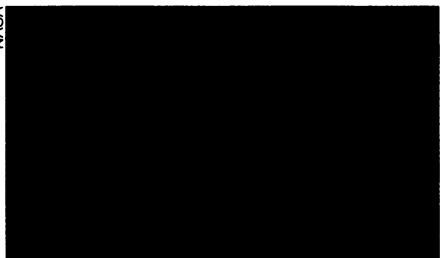
However, the Caltech team, simultane-

ously observing GRS 1915+105 at infrared wavelengths, discovered flare-ups that coincided with the dips in X-ray emissions. These infrared outbursts hint that gas is ejected from the region surrounding GRS 1915+105 rather than being swallowed, explains Swank.

The astronomers estimate that each eruption throws off 100 trillion tons of hot gas at a speed of about 650 million miles per hour—about 92 percent the speed of light—carrying 6 trillion times the energy provided by power companies each year in the United States. —S. Perkins

These computer images depict the periodic eruption of the suspected black hole GRS 1915+105. The object's powerful gravity pulls hot gas from the surface of its companion star into an accretion disk (left). Disruptions in the disk (center) regularly become so severe that material is ejected at nearly the speed of light (right).

NASA



Self-destruction may run lethal gamut

Mental health professionals have long noted that self-destruction comes in many forms and intensities. Some people repeatedly get injured in mishaps, others constantly consume alcohol or other drugs, and a determined few find ways to kill themselves instantly.

A new study delves into developmental experiences that contribute to premature deaths caused by self-destructive acts covering this wide spectrum. Two characteristics linked to adult suicides—substantial emotional and conduct problems as a teenager—also contribute to deaths ruled accidental, report Jan Neeleman, a psychiatrist at the University of Groningen, the Netherlands, and his colleagues.

In light of these findings, suicide research and prevention programs may need to tackle a much broader variety of self-destructive behavior than they have typically considered, the researchers contend in the Jan. 10 LANCET.

Their 50-year investigation focuses on a representative sample of people born in March 1946 in England, Scotland, and Wales. Ratings of behavior and emotional development of the 3,591 participants were obtained at several points during childhood and adolescence, through self-reports and observations by par-

ents and teachers.

Between the ages of 16 and 50, 167 people in the sample population died. Of those deaths, 120 were due to natural causes. From available information on the remaining deaths, a panel of 12 psychiatrists judged that 36 were accidents and 11 were suicides.

Teenagers who later committed suicide showed high emotional instability, a measure of insecurity about one's overall competence and worth. In those people, emotional instability may have heralded later episodes of depression, the investigators say.

Bed-wetting up to age 4 and low anxiety in adolescence, perhaps a sign of risk-taking propensities, also showed an association with suicide in men. Consistent misconduct and aggressive behavior as a teenager raised the likelihood of suicide in women.

This set of factors bore similar, statistically significant relationships to accidental deaths, although they displayed stronger links to suicide.

It is difficult to identify who will die prematurely because of self-destructive tendencies, Neeleman and his coworkers note. The presence in one person of traits, such as depression combined with substance abuse, that are linked to

both emotional instability and conduct problems may signify a particularly high risk of premature death, they suggest.

"This is an interesting study that supports many clinical observations of people who are excessive risk takers or are highly accident-prone," comments psychiatrist Paul C. Holinger of Rush Presbyterian-St. Luke's Medical Center in Chicago.

Psychotherapy can help such people become less self-destructive, Holinger says, but they are frequently paranoid and feel a need to punish themselves, he holds. Such traits discourage them from seeking help.

Further work is needed to disentangle the contribution of personality characteristics such as impulsiveness from the variables that Neeleman's team ties to accidental deaths and suicides, remarks psychologist Glyn Lewis of the University of Wales College of Medicine in Cardiff.

Moreover, self-destructiveness in some people may spur heavy cigarette smoking and thus play a role in deaths from natural causes, including emphysema and lung cancer, Lewis asserts.

Public health efforts, such as those aimed at lowering cigarette use, he adds, might work best by emphasizing an improved quality of life rather than a prolonged life, which may mean little to a self-destructive audience. —B. Bower