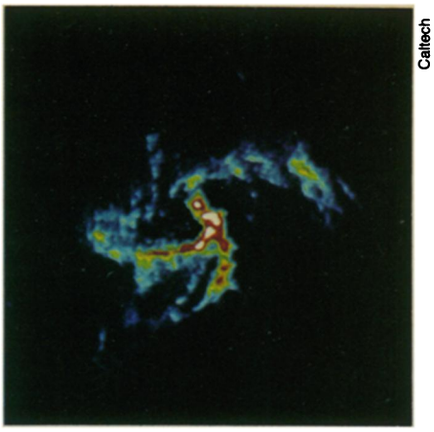
Galactic streams may show black hole

Black holes have become a favorite theoretical resource of astrophysicists. Just about everywhere in the universe that energetic processes occur in small spaces black holes are postulated at the center of the activity. Quasars, other peculiar looking objects and the centers of active galaxies are all supposed to harbor them. Now from the center of our own galaxy comes evidence that seems to be astronomers' first view of streams of matter that could be falling into a black hole.

In theory these black hole engines usually operate by drawing matter from their surroundings. As the matter falls, it converts the energy imparted to it by the black hole's gravitational pull into heat and then into electromagnetic radiation that goes off into the universe. The center of our own galaxy is by no means so spectacular as some galactic centers, but it is active enough that some astrophysicists have postulated a black hole there. The present evidence comes from a high resolution (one arcsecond) survey of the center in the 6-centimeter wavelength radio band by K. Y. Lo and M. J. Claussen of California Institute of Technology in Pasadena, using the Very Large Array of radiotelescopes near Soccorro, N.M. They report it in the Dec. 15 NATURE.



Caltech

False-color radiogram of spiral streams.

Large clouds of dust between us and the center make it invisible to us, but infrared studies indicate that there is little dust in the region closely surrounding the center. Radio observations have revealed three spiral streams of ionized gas converging on the center. The velocities observed in these streams present such a confusing picture that some astrophysicists argued that the streams are being expelled from some kind of rotating nozzle; others suggested combined explusion and rotation; yet others opted for infall.

Lo and Claussen's high-resolution study leads them to opt for a combination of rotation and infall. Taking spectra of ionized neon from various points and separating each into three components with different velocities enabled them to make sense of the velocity pattern, they say. It appears that two of the arms — the east and the west — are falling in, while the north-south one is rotating around the center and partly falling in. The detailed study also finds that the three arms do not meet at exactly the same point. If they were coming out of a nozzle, they would have to, but infalling matter does not all need to be going to precisely the same point. The rate of infall suggests a black hole three million times the mass of the sun.

—D. E. Thomsen

Analysis

Dueling Plowshares

It's hard to know exactly what to make of the current proliferation of Soviet scientists' statements on the horrors of nuclear war. Last month several scientists from the USSR participated in a U.S. Conference on Nuclear War (SN: 11/12/83, p. 314). Most recently, four distinguished Soviet scientists, along with four U.S. scientists, appeared at a Capitol Hill forum to reiterate just how unthinkably destructive it would be to trigger even a small fraction of the nuclear arsenals of the two superpowers. A sampling:

- **"Nuclear devices shouldn't be considered as a means of waging war or conducting policy. It is a weapon of suicide." — E. P. Velikhov, vice president of the Academy of Sciences of the USSR.**
- **"A nuclear war of any scope would mean either the disappearance of mankind or its degradation to a level below the prehistoric one." — Vladimir Aleksandrov, head of the Laboratory for Climate Modeling of the USSR Academy of Sciences.**
- **"A detailed, professional discussion [of separate study results by USSR and U.S. scientists projecting the effects of nuclear war] has unequivocally shown a general agreement on all the main points." — Serguei Kapitza, professor of physics at the Moscow Physico-Technical Institute.**
- **"The voice of a doctor certainly will sound in favor of peace and establishment of conditions of absolute impossibility of a nuclear war on the Earth." — Alexander Pavlov, president of the All-Union Society of Radiology, USSR.**

All this was told to Sens. Mark O. Hatfield (R-Ore.) and Edward M. Kennedy (D-Mass.), who chaired the forum, with the apparent sanction of the Soviet government and was covered extensively by the Soviet press and television. The U.S. scientists — Carl Sagan, Lewis Thomas, Paul Ehrlich and Jack Geiger — couldn't have agreed more wholeheartedly with their Soviet counterparts on most points. It was a case of dueling plowshares.

But how did this unusual scenario come about, and what does it all mean? Are the Russians — by virtue of permitting their scientists to voice such views publicly — softening their stance on nuclear arms? Or is it merely a propaganda ploy to see which country can "out nice-guy" the other?

The World After Nuclear War

Velikhov, via TV link, addresses November U.S. conference.

"It's so hard to know . . . but I have to look at it with a jaundiced eye," says Stephen Gibert, director of the National Security Studies Program at Georgetown University in Washington, D.C. Gibert, author of the book *Soviet Images of America* (Crane Russak, 1979), notes that the trend toward more public, anti-nuclear statements by the Soviets actually began in December of 1979, when the North Atlantic Treaty Organization adopted a measure leading to the placement this month of Pershing II missiles in West Germany. "Ever since then, the Soviets have been pouring the heat on the Europeans, talking about the 'horrors of nuclear war,'" Gibert says. "It's conceivable that these guys [the Soviet scientists] are genuine, but we must always bear in mind that they may be trying to do nothing more than scare the Europeans and play up to the peace movement in Western Europe. I can't remember a time of more sustained [rhetorical] pressure by the Soviets on Western Europe than during the period since 1979," he says.

Gibert points out that there has always been a strong dissident element among the Soviet scientific community. "And the Soviets have always said that nuclear war is bad and should be avoided," Gibert says. "Still, they have always believed that there would be a significant distinction between the winners and losers, and they intend to be the winners."

—J. Greenberg