

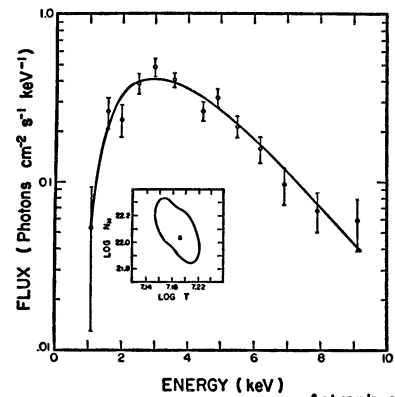
X-ray blackbody: A neutron star?

In recent years neutron stars, which used to be a kind of speculative curiosity, have become a live topic among astronomers, and a good deal of new theoretical work has been done on them (SN: 2/27/71, p. 151). The reason is that many thought that pulsars were neutron stars, although there has never been any direct evidence of it.

Now, while some astronomers are beginning to wonder whether pulsars really are good candidates to be neutron stars, a group at the University of California at Berkeley—Stuart Bowyer, Michael Lampton, Ray Cruddace and Bruce

Margon—have put forward another object that they think has better neutron-star credentials. Their candidate is the X-ray source GX340+0, located on the boundary between the constellations Ara and Scorpius at right ascension 16 hours 43 minutes and declination minus 45 degrees 9 minutes.

The designation of GX340+0 as a possible neutron star began with a determination that its X-ray spectrum is that of a blackbody or perfect thermal radiator. "There exists a limited range of source models that could produce a blackbody spectral distribution peaked at X-ray wavelengths," the Berkeley



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GX340+0 spectrum: Blackbody fits.

AEC to nuclear industry: We're no longer your protector

The new Chairman of the Atomic Energy Commission served notice on the nuclear industry last week that the AEC was ending its tradition of promoting and protecting the industry. The AEC, James R. Schlesinger told a joint conference of the Atomic Industrial Forum and the American Nuclear Society in Bal Harbour, Fla., "exists to serve the public interest. The public interest may overlap, but it is not coincident with private interest."

The policy pronouncement came in a strongly worded speech that sharply contrasted in tone and content with the public addresses of his predecessor at the AEC, Glenn T. Seaborg, who often defended the nuclear industry against its critics. The policy departure will be welcomed by environmental interests, which had increasingly criticized the agency for what they regarded as an overly protective relationship with the industry it is supposed to regulate. It will hardly be received with joy by industry representatives, who had already been dealt a major setback by a Federal Court of Appeals decision this summer blocking construction of a nuclear power plant at Calvert Cliffs, Md., and severely criticizing the AEC's environmental policies. The AEC subsequently ordered reviews of construction permits and operating licenses for 96 nuclear power stations around the nation.

Schlesinger's speech last week was his first formal expression of views before a large segment of industry since taking office two months ago.

He told the industry it was now mature enough to stand on its own feet and be self-sustaining:

"From its inception the Atomic Energy Commission has fostered and protected the nuclear industry. Looking back one can, I think, say that this was the right policy for that historical epoch." But, he continued, "The move toward greater self-reliance for the industry had a certain historic inevitability. Such a process is always painful. It is, however, necessary. One result will be that you should not expect the AEC to fight the industry's political, social and commercial battles. These are your tasks—the tasks of a self-reliant industry."

Schlesinger reemphasized the point: "It is not the responsibility of the AEC to solve industry's problems which may crop up in the course of commercial exploitation. That is industry's responsibility, to be settled among industry, Congress and the public. The AEC's role is a more limited one, primarily to perform as a referee serving the public interest."

As for environmentalists, he said, "a number have bad manners, but I believe that broadside diatribes against environmentalists to be not only in bad taste but wrong."

Schlesinger acknowledged that his words were strong and his message not easily palatable. Yet, he told the industry officials, "as the AEC performs its public role, I believe that it will help you to achieve your legitimate and long-run objectives."

group says. One of these is a neutron star.

But a bare neutron star proved a disappointing choice because of temperature. The observed blackbody spectrum is that for a temperature around 10 million degrees K. According to theory a neutron star that formed at that temperature should cool off in about a year. Since GX340+0 has been observed since 1965, Bowyer and his colleagues conclude that it is unlikely to be a newly formed neutron star.

There is, however, a way to keep a neutron star hot: by constant accretion of interstellar matter. Theoretical studies have shown that such a process would also yield a blackbody spectrum "within the energy range of our observations," according to the Berkeley group. To get the temperature they have observed, they have to alter the rates of accretion that were figured into the models they refer to, but they are confident this can be done without destroying the theory's application to this case.

The temperature of a blackbody determines the absolute intensity of its radiation. Knowing this and the flux actually observed, the group could calculate the angular size of the object. It came out to something between one and two times 10^{-32} steradians. The distance to the object can be figured from the amount of radiation that has apparently been absorbed on the way to the earth and the density of interstellar matter. The distance comes out to about 9,000 light-years. From this and the angular size, the radius of the object is calculated to be about 8 kilometers.

Thus the final conclusion of the group is that GX340+0 is a neutron star about 16 kilometers in diameter at a temperature about 15 million degrees K. that is undergoing a process of continual accretion of interstellar matter. □