

Astronomer 'dives' into galactic black hole

Prof might have this one 'in the bag'

By KATHLEEN MONJE
Of the Emerald

The possibility of "black holes" in space has fascinated astrophysicists and science-fiction writers for decades.

The idea of an invisible gravitational field so dense that not only matter but light disappear inside it is both intriguing and almost incomprehensible.

For the past three years, University astronomer James Kemp has been investigating a possible black hole in the star system Cygnus X-1.

"This is the only case where people think they have one in the bag," Kemp said. "Cygnus X-1 is the only known binary (two-star system) where the secondary star is highly compact (or collapsed) and at the same time has sufficient mass to be a black hole."

A black hole is the third stage of a star that has collapsed in upon itself, astronomers say.

The first is the white dwarf, and the second is the neutron star, which has compressed enough that its protons and electrons have merged to become neutrons. Black holes and neutron stars are detectable only through X-ray telescopes.

"If you look at Cygnus X-1 in an ordinary telescope, you will see only a single star," Kemp explained. But the black star can be detected visually by its influence — "anything that comes within its sphere disappears."

Kemp's research team has concentrated on comparing the visible and X-ray light variations from Cygnus X-1. He presented the results of their work at an American Astronomical Society meeting Wednesday in Austin, Texas.

"My work has shown that the star system is more complex and interesting than previously thought," Kemp said. One result is a different way of measuring the secondary star's mass.

"The black hole is only half as large as previously thought. It is only three miles in diameter, with the density of five solar masses," Kemp told his colleagues at the meeting.

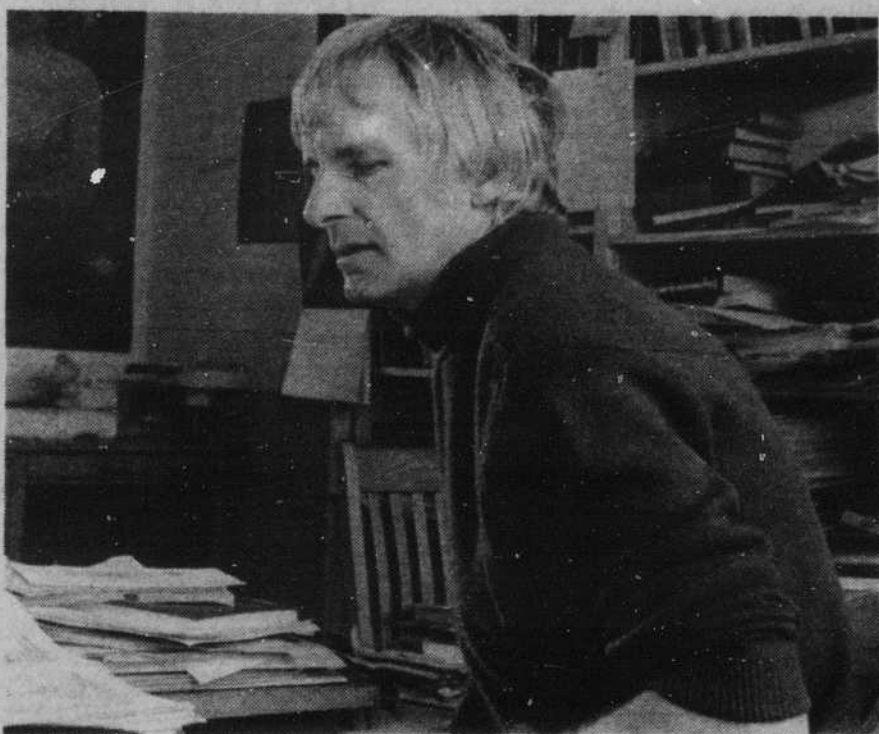
His research also suggests a more controversial development: the possibility of not one, but two, unseen star masses orbiting the visible Cygnus X-1.

Studies of Cygnus X-1 have established a definite invisible mass exerting a gravitational pull, which causes well-identified light variations every 5.6 days, on the visible star some 7,000 light years from Earth.

However, Kemp, and University students working with him, found additional faint light variations occurring in 78-day cycles, which they think may be caused by a third star with an eccentric orbit somewhat similar to a comet's.

This third star, with a mass less than our sun's, causes the light variations when it comes close to Cygnus X-1 and is heated by the contact.

Further research over the next two years could prove that the second star is not a black hole, Kemp said.



James Kemp

Photo by Steven Scher

Instead, the third star could be a neutron star and the source of the X-rays, with the secondary star simply an ordinary one," he said. "In any case, it's an extraordinary system, because it's the second strongest X-ray source in the sky."

Nobody has been able to make a close connection between the flux in X-ray emissions from the unseen star and the light variations of the visible star, Kemp said.

"It is as if the X-rays come from a place very far removed from the star we see in the telescope," he said.

"Astronomers have been putting black stars in the nuclei of galaxies and in clusters of stars without any evidence for them," Kemp said.

"It's the job of observational astronomers like me to find out if they really exist."

Neutron stars were predicted in the 1930's, he said, but the first definite case wasn't found until 1970.

"The idea is to get a black hole we can play with, and verify all the properties the theorists have talked about," he said. "Or, we might prove they don't exist."

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