

Stellar double shifting Beaming black hole?

Our galaxy's most mysterious object is the subject of a worldwide investigation prompted by a University of Toronto astronomer and supported by astronomers at NRC's Dominion Astrophysical Observatory.

"It is the most dramatic and exotic object in our galaxy," says David Crampton by way of introduction. An astronomer at NRC's Dominion Astrophysical Observatory in Victoria, B.C., Dr. Crampton is one of dozens of scientists who have studied the bizarre celestial object known as SS433. He and his colleagues helped eliminate some of the mystery surrounding the object by showing that it is two bodies rather than just one — a binary system. But evidence collected over the past two years has raised as many questions as it has answered. Just what is SS433? A quirk of stellar evolution? A magnetic supermystery? Or a perturbed pulsar?

Interest in SS433 involves a series of unusual coincidences, and points to the problem that rapid strides in modern astrophysics create for scientists trying

to keep up with their colleagues' findings. SS433 was first catalogued by two Ohio astronomers. Bruce Stephenson and Nicholas Sanduleak, during their 1960's survey of "unusual" stellar objects. Shortly thereafter it was noted in a catalog of stellar radio sources, but its location was not as precise as the earlier observations. X-ray sightings, made by satellite, also "found" the object, but once again failed to pinpoint it accurately, resulting in three separate objects being identified in radio, optical, and X-ray catalogues. Not until 1977, when University of Toronto radio astronomer Ernest Seaquist investigated some of the SS catalog entries and discovered a variability in number 433, did its unusual nature begin to emerge. His brief report might have been overlooked as the others had been, except that an Anglo-Australian team was making optical and spectrographic measurements of the same object. And that's when the real surprises began to emerge.

While Canadian, British and Australian researchers were trying to make sense of their findings, American as-

tronomers Bruce Margon and his University of California colleagues brought the object to more public notice as the result of an intense spectral analysis that utilized four observatories in the southwestern United States. The study was aimed at following up on identified X-ray sources, and SS433 had already been tagged as one by the British Ariel satellite. As the data were examined, the spectral lines in the light from the object suggested the truly impossible — it appeared that SS433 was moving in two directions at once!

SS433's strange behavior emerged when spectral data indicated a simultaneous movement toward and away from earth. Observations over an 18-month period produced these sinusoidal curves, which suggested the anomalous motion moved to a peak then reversed itself. (Graphic: John Bianchi)

Le comportement étrange de SS 433 est apparu lorsque les données spectrales ont mis en évidence un mouvement simultané d'approche et d'éloignement de la Terre. Résultat de 18 mois d'observations, ces courbes sinusoïdales sont à l'origine de l'hypothèse selon laquelle le mouvement bizarre de SS 433 atteindrait un maximum pour ensuite s'inverser. (Illustration: John Bianchi)

