

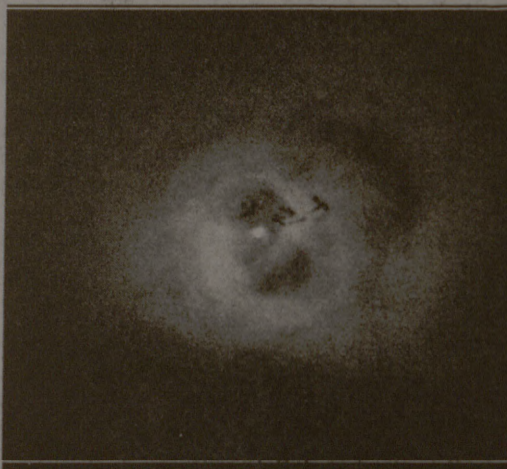
# SCI|TECH

THE BATTALION

Page 10 • Tuesday, September 23, 2003

## Tone deaf no longer

Scientists discover deepest sound ever in Perseus galaxy



Chandra X-Ray [3-color]



Chandra X-Ray [Sound Waves]

PHOTOS COURTESY OF CHANDRA HARVARD

At left is the Perseus galaxy cluster as seen through a Chandra X-ray before the identification of sound waves.

The sound waves found in Perseus' black hole [right] are far lower than what an average human being can hear.

By Amelia Williamson  
THE BATTALION

Astronomers danced to a new tune Sept. 9 when NASA's Chandra X-ray Observatory caught hold of the deepest sound ever detected from an object in the universe. This sound is far below the range that humans can hear — 57 octaves below the middle C note on a piano, according to NASA. As Dr. Roland Allen of the Texas A&M Department of Physics said, "It's like nature is singing to us in a very low voice."

Chandra found these high-energy sound waves rippling out from the center of the Perseus galaxy cluster, located 250 million light years from Earth. NASA scientists believe the sound waves originate from a supermassive black hole in the center of the cluster.

Andrew Fabian of the Institute of Astronomy in Cambridge, England, who is the leader of the study, told NASA "We have observed the prodigious amounts of light and heat created by black holes, now we have detected the sound."

Chandra is a space telescope that NASA launched into orbit in 1999 to observe X-rays and produce images of areas in the universe that emit high levels of energy. According to Dr. Christopher Pope, also part of A&M's Department of Physics, X-ray observation is vital to studying high-energy objects. Astronomers must study X-ray emissions from orbit because the Earth's atmosphere absorbs the rays.

"(Chandra) is worth the millions of dollars of funding because it shows us things that we cannot see from here on Earth," Allen said. "It benefits everyone in the world."

Chandra is one of four observatories that orbit the Earth and is accompanied by the Hubble Space Telescope, which observes visible light, the Compton Gamma Ray Observatory, which detects gamma rays and the Space Infrared Telescope Facility, which explores using infrared light.

According to the Chandra X-ray Observatory Web site, scientists came across the sound waves while viewing Chandra's processed images of the Perseus cluster that show differences in brightness. In previous Chandra images, astronomers found two cavities stemming from the black hole that give off large amounts of radio waves. Black holes emit

large jets of material that push through the gasses of the galaxy cluster, creating these cavities that contain high-energy particles and magnetic fields. The cavities move the surrounding gasses in the cluster causing high-energy sound waves to ripple through the universe.

For many years, scientists have struggled with the issue that the hot gasses near the center of the Perseus cluster have not cooled down. Astronomers theorized that in galaxy clusters that emit X-rays, the hot gasses should cool down over time, condense and give birth to an immense number of stars. When scientists observed clusters however, they found that this was not the case. Astronomers were puzzled that after billions of years, the gasses are still hot. NASA indicated that the high-energy sound waves beaming from the center of the cluster could be the answer to this long-lived question.

As the sound waves travel through the gasses in the galaxy cluster, the energy spreads out, absorbed and transferred into heat. The heat produced by the sound waves could be the agent that is heating the gasses in the cluster and preventing its cooling.

The discovery of these sound waves is extremely significant because by studying the high energy that the waves let off, scientists could learn a great deal about galaxy clusters.

"This discovery gives us more information about the evolutionary development of galaxy clusters. Not much was previously known about how they form and expand," said Dr. George Kattawar of the A&M Department of Physics.

In the past, astronomy professors have had to tell disappointed students that the process of evolution for galaxy clusters was unknown. Soon, however, with Chandra's newly discovered information, professors will finally be able to explain how galaxy clusters, the largest groups of objects in the universe, develop.

The A&M Department of Physics faculty keeps a close eye on new discoveries and is working on integrating more astronomy into the curriculum. "Curiosity drives us," Dr. Kattawar said. "It is remarkable to contemplate all the things going on in the universe — it's mind-blowing."

The Department of Physics posts information on astronomy classes and new astronomical discoveries at <http://astronomy.tamu.edu>.

"It is remarkable to contemplate all the things going on in the universe — it's mind-blowing."

— Dr. George Kattawar  
Department of Physics

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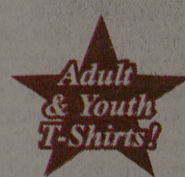


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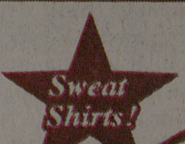
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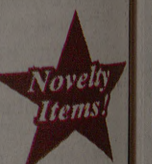
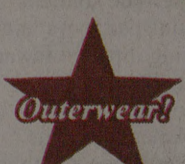
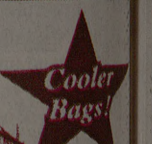
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Thursday, September 25th  
8a.m.-8p.m.  
Friday, September 26th  
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Saturday, September 27th  
8a.m.-One Hour Prior To Game Time  
Sunday, September 28th  
9a.m.-5p.m.



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