

Space Shuttle:

PSU scientists experiment in space to find answers to Earth's mysteries

By ANTHONY NEWMAN
Collegian Science Writer

Like college students trying to get home for the holidays, University researchers are hitching rides for their experiments aboard the space shuttle.

Penn State researchers from a variety of disciplines agree that the craft's most important feature is its ability to address questions that cannot be answered on Earth.

John Nousek, astronomy research associate and investigator for one shuttle experiment, said the shuttle's top priority is not to address these scientific questions but to improve the commercialization and industrialization of space.

"But the National Aeronautics and Space Administration is also sensitive to the needs of scientists," Nousek said. "Researchers may get kicked off for higher priority projects, but NASA is doing all it can to ensure that any excess space is put to good use."

Not surprisingly, the astronomy department is especially eager to catch a shuttle ride into space. Three projects are planned for future space shuttle flights.

All three will be scanning the universe for x-rays — radiation given off by highly energetic objects such as galaxies, quasars and black holes, said Gordon Garmire, University professor of astronomy.

Astronomers must study x-ray emissions from space because the Earth's atmosphere filters this radiation out, Garmire said.

To examine these x-rays, Garmire is leading a University research team developing the Advanced X-Ray Astrophysics Facility.

The University is one of four institutions acting as contractors for the satellite, scheduled to be carried into orbit aboard the space shuttle in the early 1990s, Garmire said.

"The AXAF is the highest-priority astronomical program for the 1980s as rated by NASA," Garmire said.

University researchers are developing the x-ray detector to be used on board the space telescope, Garmire said. The detector, called a charge couple device (CCD), consists of several silicon plates, each containing thousands of x-ray sensors.

Because x-rays are emitted by some of the most mysterious objects in the universe, AXAF is expected to provide answers to fundamental questions about these celestial bodies.

The satellite will be on the look-out for black holes, Garmire said, locating them by picking up the x-rays emitted when hot material falls inward.

The AXAF will also study supernova remnants (the remains of exploded stars), trying to identify their constituent elements, Garmire added.

The University's CCD will be 100 times more sensitive than NASA's previous x-ray observing satellite — the Einstein Observatory, which burned up in the Earth's atmosphere in 1983, Nousek said.

The AXAF's sensitivity will also enable extensive study of quasars — extremely bright objects located on the edge of the universe, Nousek said.

Since light travels at a finite speed, radiation leaving a distant object may take millions of years to reach Earth. With distant objects like quasars, scientists are looking back in time to a phenomena only present in the early universe.

Nousek, the University's principle investigator for the Spartan project, explains that the Spartan is a "mini-AXAF," also designed to collect information about x-ray sources.

The differences between Spartan and AXAF are size and cost.

NASA created the Spartan project because astronauts needed a way to collect x-ray data that was less expensive than a satellite and more reliable than a rocket that would blast off, collect five minutes of data, then come down, Nousek said.

"The Spartan will sit in the (shuttle's) payload (bay). Once into orbit, the shuttle arm grabs the Spartan and drops it off, and at the end of the mission returns to pick it up again," Nousek said.

"One advantage here is that the Spartan will collect 40 hours of data while the shuttle can go and do what it wants."

Like the AXAF, the x-ray detectors will be collecting data on x-ray emitting celestial bodies, Nousek said. Unlike the AXAF, data will not be transmitted to Earth but will be recorded on the craft.

University researchers will be designing the telescope mirrors for the Spartan, while Columbia University researchers are working on the x-ray detectors.

"The Spartan will also cost significantly less than the AXAF satellite, Nousek said.

Although the Spartan, costing about \$400,000, will not compare with the long-term data-gathering potential of the AXAF, which costs \$750 million, Nousek said he is pleased with the rapid progress being made on getting the project into orbit.

"The Spartan is scheduled to go up in March of 1988 — not had considering we started planning six months ago," Nousek said.

The third and least expensive astronomy project is part of NASA's Get-Away Special Program, said Dave Burrows, an astronomy research associate.

Unlike the AXAF or the Spartan, the Get-Away Special project, costing only about \$100,000, will not leave the shuttle at all, Burrows said. Instead, it will be placed in one of several small canisters, about the size of trash cans, lining the inside of the shuttle payload area. When the shuttle doors open, the x-ray detectors will be able to quickly scan a small section of the sky, Burrows said.

"It's not a very versatile experiment; it's going to look at many small pieces of the sky and make some quick measurements," Burrows said, adding that researchers will not be able to control where the experiment is pointed.

"However, the experiment is designed to do one job and it will do that particular job very well," he said.

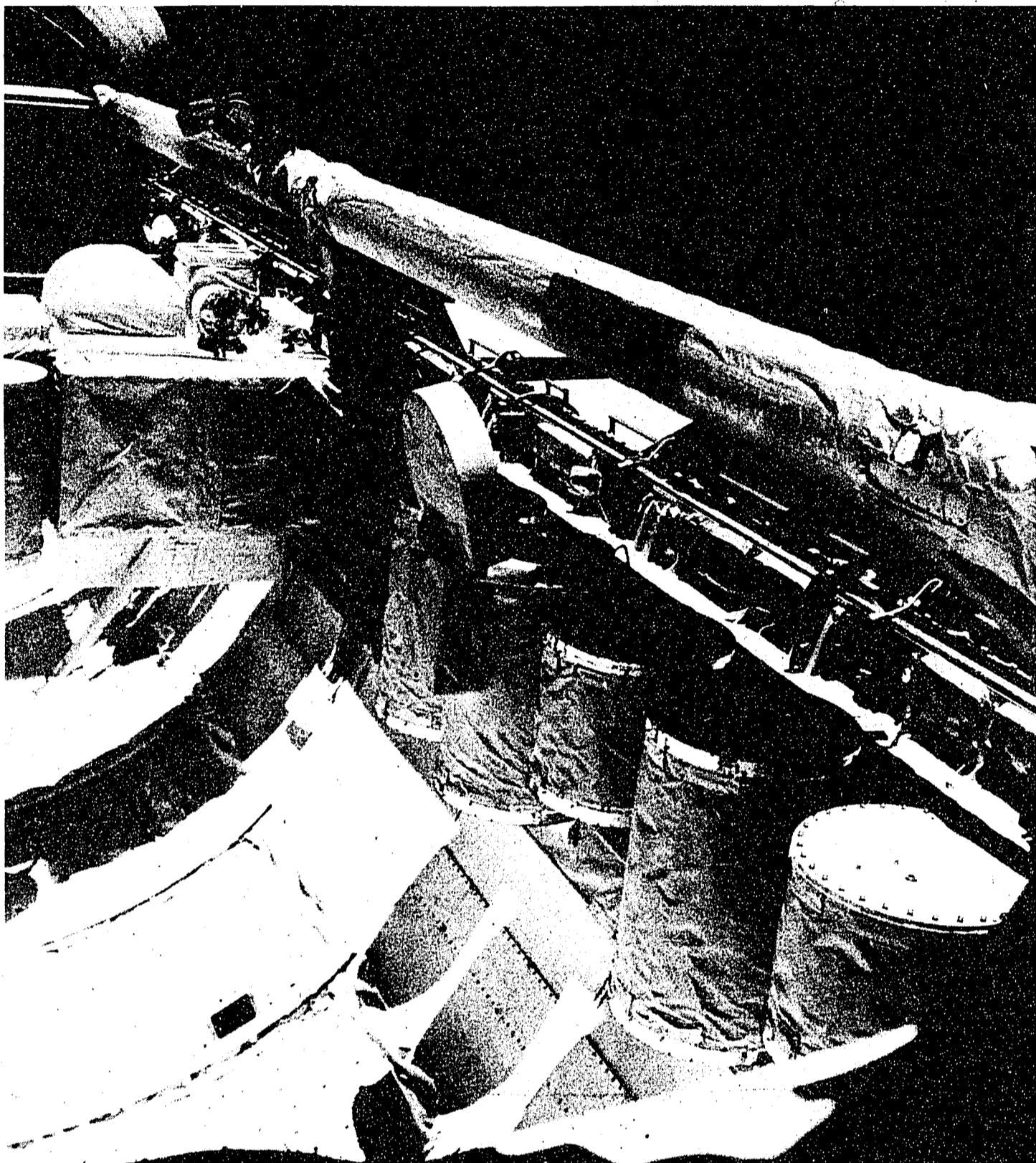
Burrows said the main objective will be to study the mysterious diffuse x-ray background radiation, which has no known origin but seems to be coming from all directions of the universe.

"We're hoping for some information about the variations of this radiation in the galaxy. Does it originate from quasars, galaxies, or an intergalactic source? One of our objectives is to understand it better," he said.

"As in all x-ray emission studies, we have to get above the atmosphere, and we want to be on the shuttle for a fairly long time," Burrows said.

The Get-Away Special project, like all of the astronomy department's shuttle projects, will be funded by NASA. It will be launched with the shuttle sometime next year, Burrows said.

Small as the Get-Away Special containers are, a big effort has been made by 150 engineering students to fit three experiments into a single canister for inclusion on a shuttle flight. The four-year effort will transform into results on December 20th when the space shuttle is scheduled to carry "Payload G-62" into orbit.



The space shuttle cargo bay carries Get-Away Special canisters each an astronomy department team are using the program to get their housing an experiment. A group of University engineering students and experiments into space.

and more dense cells would be more likely to separate on the basis of their weight rather than because of their electrical charge.

"If we could eliminate the gravity component we could be certain the cells separate on the basis of (their electrical charge) only," Hymer said.

"The purpose of the experiment was to test electrophoresis. It was, in fact, a test of a test," Todd said.

In December of 1983, the space shuttle took off carrying an electrophoresis machine and a sample of human kidney tissue. The experiment was designed to separate certain enzyme-producing cells from the remaining kidney cells, Todd said.

"About five percent of human kidney cells produce an enzyme called urokinase. Electrophoresis will give you a pure (group) of these cells while removing them in a fashion that keeps them alive. We chose (these kidney) cells because they would make an interesting product," Todd said.

"The experiment proved that the effect of gravity on the method is small, so that scientists can be confident that charge is the major influence of separation, Hymer said.

Electrophoresis, then, retains its status as an easy and relatively error-free method of separating cells.

"The space shuttle showed us that we can separate cells on Earth... and feel that what we learn from that separation is correct," Hymer said.

Hymer conducted a similar experiment on the same flight with rat pituitary gland cells. However, when preparations for flight were being made, he was able to include some leftover cells, intending to examine their

hormone content when they returned.

After comparing the space cells with pituitary cells that did not go up, Hymer found the cells from space did not release as much growth hormone.

His chance to test these effects in a living organism came in April, when Hymer examined the pituitary glands cells of several rats that traveled on the space shuttle.

Hymer and his staff examined the rats' pituitary cells and found that although they were producing just as much growth hormone as Earth-based cells, much less hormone was able to move out of the cells, as it must be to be useful to the organism.

Hymer said the growth hormone producing cell may not be receiving the correct signals from other chemicals that stimulate hormone synthesis and release. Growth hormone is necessary for normal metabolism and growth in mammals.

Another hypothesis is that the microgravity has a more direct effect on the pituitary gland cell itself, he said.

Hymer has been approved to fly more cells in Sept. 1986 when room on the shuttle will again be available.

Like the researchers in astronomy and engineering, he has found selection and admission to the shuttle programs to be involved and lengthy. Researchers must write extensive proposals and assure NASA that their experiments are safe and feasible in every respect.

"It's important to say that the projects involve a cooperative effort by a large group of people," Hymer said. "But it's worth it — it's exciting to be involved in something new and different like the space shuttle."

The experimental capabilities of the space shuttle are not limited to physical phenomena. Two University life scientists found a perfect opportunity to test the effects of zero gravity on biological systems during recent space shuttle flights.

Paul Todd, University professor of biophysics, was co-investigator in an experiment designed to test the method for separating cells and molecules. The technique, called electrophoresis, is a commonly used laboratory method, allowing scientists to purify cells and their products, such as hormones and enzymes.

According to Wesley Hymer, University professor of biochemistry, the purpose of the experiment was to test the role of gravity in the electrophoresis process. Electrophoresis works by selectively pulling cells that have a particular electrical charge.

Scientists have suspected that gravity played a significant role in the separations of cells, resulting in errors in the interpretation of experimental data. For example, larger



Paul Todd, professor of biophysics, examines kidney cells flown in a 1983 space shuttle experiment.



Wesley Hymer, professor of biochemistry, displays the "hollow fiber" he devised to implant pituitary cells. Hymer implanted cells that had been exposed to the microgravity environment of space into earth-based rats.

Libel said to inhibit reporters police log

By LAURA O'BRIEN
Collegian Staff Writer

Investigative Reporters and Editors in St. Louis.

"Many of the people surveyed they didn't report, or reported differently, less vigorously, because of the fear of libel," Pavlik said.

The report said 19.7 percent of the journalists surveyed believed there had been at least one occasion when readers had been uninformed because the reporter or organization was worried about being sued, Labunski said.

Richard E. Labunski, co-author from the University of Washington in Seattle, said the survey suggests that some stories may have been ignored or treated differently because of the threat of legal action. Labunski was an instructor at Penn State until he went to Washington in 1984.

Pavlik and Labunski surveyed 80 members at the Annual Convention of

medical malpractice in the same time period.

But the concern about libel may be healthy, Pavlik said. The constant threat may make reporters more concerned and thoughtful, making their work more deliberate. He added that the work may take longer, but it will be safer because there will be less carelessness.

"Libel suits in the courts is just the tip of the iceberg," Pavlik said.

The threat is actually bigger than what the public sees because of the number of libel suits settled out of court, he said.

According to the survey, more than 25 percent indicated their organization has between one and six libel suits pending. At least one libel suit has been settled out of court by 32 percent of the organizations, Labunski said.

Poll to study PSU education quality

The Undergraduate Student Government's Academic Assembly will conduct a survey to assess the University's student opinion on education quality, assembly president Jay Clark, said.

"If everything works right, we ought to be able to run the survey in the first week of December," Clark said.

The survey, to be conducted in conjunction with the student councils of the University's 10 colleges, will address academic, advising and instructional quality.

"We're surveying 3,300 students," Clark said, "which is approximately 10 percent of University Park students."

Sandra Churchin, president of the College of Engineering Student Council, said the survey is the first of its kind in the United States. She said there have been many surveys on a lesser scale, but nothing of this magnitude. The survey will attempt to assess students' needs

compared to current program offerings, determine if the University's Policies and Rules for Students are followed. It will also attempt to understand the primary factors of motivation for students and to evaluate the quality of the colleges.

The Assembly chose to survey students in class to assure higher response than could be expected through a mail or phone survey, Clark said. Last year's plus/minus grading survey proved successful when done in class, he added.

"We received an 85 percent return rate on the plus/minus survey," Clark said, "We should receive at least that amount in this survey."

In addition, he said there was no question of validity on the plus/minus grading survey and he does not expect any validity problems on this survey.

—by John L. Spence

collegian notes

The Free University will hold a vegetarian cooking course at 6:00 tonight in 307 Willard.

The Residence Hall Advisory Board will meet at 6:30 tonight in 319 Willard.

The German Club will meet at 6:30 tonight in the Warnock Cultural Lounge.

The Student Counselors will meet at 6:30 tonight in 316 HUB.

Circle K will meet at 7 tonight in rooms 323 and 324 HUB.

The Science Fiction Society will meet at 7 tonight in 316 Boucke.

The Business Student Council will meet at 7 tonight in 73 Willard.

The Society of Physics Students will hold elections and laser show practices at 7 tonight in 105 Omer.

The Student Union Board will meet at 7:30 tonight in 307 HUB.

The Nittany Atari Personal Computer Organization will meet at 7:30 tonight, first floor, U.S.D.A. Pasture Research Laboratory.

The Fencing Club will meet at 8 tonight in 33 White Building.

Robert Zaph, an employee of the Nittany Lion Inn on campus, reported yesterday that three telephones were missing from the Mount Nittany Room, University Police Services said.

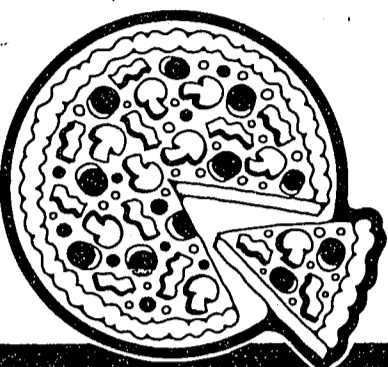
A camera and lens worth \$225 belonging to Michael Orberg, 1008 Fincho, were reported missing Sunday after he lost them at Beaver Stadium, Saturday, University Police said.

State College police reported Sunday that six mailboxes worth about \$90 were missing from the 900

block of East McCormick Avenue.

Gwen Kaufman, 5 Porter, coordinator of residence hall programming, reported yesterday that a reserved parking sign from parking area Blue G was missing, University police said.

—by Tom Schaffner



PIZZA NITE AT THE GRINDER

EVERY TUESDAY Fresh, hot pizza and a frosty pitcher of beer.

What could be better for friends to share? Your favorite toppings by request. All at a special Pizza Nite price!

Music Nightly



11:30 to 11:00 p.m. daily • 777 North Main Street • 825 S. Main Street • 237-1040

CONSTRUCTION SPECIAL!
1/2 OFF every frame in the store
A little inconvenience. A little dust. A little noise... Means BIG SAVINGS to you!
To make up for any inconvenience during the construction of the new parking garage, we're giving you this incentive to visit Wise Eyes.
PLUS! **TWO YEAR GUARANTEE**
Repair or replace broken lenses in 2 years. Come in for details.
WISE EYES
125 S. Fraser St. 234-1040

Cross Country Ski Club's Fall Semester Meeting
Slide Presentation of Icefield Skiing in Alaska
Wed., Nov. 6 7:30 pm
111 Boucke
* Free Cider & Donuts *

12 WEEK BAR
Tuesday Nights are Burger Nights
2 1/2 lb. 75¢ hamburger
next to the train station

You're Invited!
Celebrating Our 13th Year with a **Happy Birthday SALE!**
10% to 75% Off Storewide
Sunshine Imports
127 E. Beaver Ave.

Ruth K. Lavin
My name is RUTH K. LAVIN. I'm running for Borough Council because I want to represent you, the citizens of State College; and because I'd like to serve on Council with my campaign mates, JOHN A. DOMBROSKI and FREMONT DAN WINAND. I encourage you to vote today for Dombroski, Winand and for me, RUTH K. LAVIN.
Nov. 5th

EXPERIENCED PIZZA MAKER
Maria's PIZZA
This Week's Special is
A Large Pizza for only **\$4.50**
Large Pizza with 1 Topping only **\$4.99**
Call 238-3112 No Checks Please
418 Clay Lane Free Delivery
DRIVERS WANTED DRIVERS WANTED DRIVERS WANTED

THE SPLENDOR OF CULTURED PEARLS.
AND NOW AT **SAVINGS OF 30% OFF** DURING OUR ANNUAL PEARL SHOW & SALE NOW THRU NOVEMBER 16th
O Strands of cultured pearls in every size, length and quality imaginable.
O Cultured pearl earrings and pendants; with and without diamond accents.
O Fresh water and salt water pearl pins in 14 kt. solid gold settings.
O Cultured pearl rings with and without side diamonds.
O Layaway for Christmas gift giving and save 30%.
moyer jewelers
Corner of College and Allen
1000 State College
Open To Serve You
Monday thru Friday 9:00AM to 5:30PM
Saturday 9:00AM to 5:00PM
Financing Available

Our Type is Your Type
Experience the latest in "high tech" computerized photo typesetting with **COMMTYPE**
Commercial Printing's own integrated system. We will keyboard from your manuscript, or process TELECOMMUNICATED copy transmitted by telephone from your word processor and modem... and turned around to you in just hours — not days.
Choose from 100 authentic Mergenthaler "Superfont" type faces directly on-line in our system. Be assured of quality repros, produced by the most experienced typesetting staff in Central Pennsylvania. Pasteup and other graphic art and design services are also available.
COMMTYPE found only at:
COMMERCIAL PRINTING inc
1224 NORTH ATHERTON ST./P.O. BOX 156
STATE COLLEGE, PENNSYLVANIA 16801
Phone: 814-238-3025

TUESDAY IS BAGEL TUESDAY AT THE BAKERY
130 West College Ave.
CALL IN ORDER FOR EXPRESS SERVICE 238-8055
6 FREE BAGELS w/COUPON
purchase 1 doz. bagels (any kind) and receive 6 FREE
Good any Tuesday
State College's **ONLY Bakery!**
OPEN MON.-SAT. 7 a.m.-6 p.m. SUNDAY 8 a.m.-2 p.m.

Color your day... WITH THE Collegian ARTS SECTION