Meteoric advances in space science program

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Standing nearly 69 feet tall, the giant structure on the hill overlooking Morehead State University's campus might look to some as simply an oversize satellite TV dish.

But to those involved with the university's Space Science Program, the dish - which is actually a space tracking antenna system that can control satellites and measure celestial masses - remains a beacon for a program that's traveled light-years from its days in a garage apartment.

"We've come a long way," said Benjamin K. Malphrus, director of the Space Science Center, who started the program after coming to Morehead in the 1990s as an astronomy professor.

Now, faculty and staff are helping engineer and launch Kentucky's first satellite. They're using their three-year-old, $3 million antenna to measure energy from the moon and even, accidentally, a black hole. And they're about to move into a $15.4 million state-of-the-art new home this spring.

Malphrus said that over the next five years he hopes to double the number of full-time faculty members to 12 as well as the number of students. This year, Morehead has 24 students in space science _ one of just five such bachelor's degree programs in the country - and 10 students in astrophysics.

The program has attracted professors and experts from across the country, including the antenna engineer who was a little like James

Bond's "Q" in his previous professional life.

Jeff A. Kruth, who ran an engineering research firm in Maryland for three decades before coming to Morehead, once designed for U.S. agents an all-purpose wire-tapping kit that fit into a video recorder case and created a full spy station in a shipping container for the British.

Kruth brought with him scores of gadgets and receiver equipment, which he had to pile up in the program's most recent home in the bottom two floors of a soon-to-be razed Nixon-era dormitory. But the days of cramped, inefficient, out-of-date quarters are nearly over.

In May, the Ronald G. Eaglin Space Science Center, named after the MSU president who retired in 2004, is scheduled to open with many innovations. It will feature a 108-seat domed "Star Theater," prime laboratory space and a modern control room for the tracking antenna.

On a mid-December tour of the center's shell of steel, glass and naked drywall, Malphrus and a couple of the program's students gushed.

"This is going to be the coolest building ever built," said Jason Smathers, a senior, after visiting the "clean room," an airport-hangar-size room that will house the development of antennas and nanoÂtechnologies. Another tall, but narrower, room will be the anechoic chamber where satellites will be tested for how they hold up to radiation.

But the centerpiece will be the control center for the space tracking antenna system, complete with three plasma screens for monitoring.

Students have had to trek up the hill to the control room beneath the antenna to do their work, such as tracking the energy given off by entities such as the moon.

To do it, they position the antenna to be ahead of the mass they're seeking to measure so that it passes through the antenna's signal, much as a quarterback aims to throw a football out in front of a receiver.

In one case, a student overshot the moon and was intercepted by a black hole -- an intense gravitational field from which neither light nor matter can escape -- which was then measured instead.

"It ended up being the best map anybody had ever made" at Morehead, Smathers said, pointing to a rainbow-colored graph in the shape of the Liberty Bell.

Malphrus and the university say such experiments are the foundation for grander ambitions, not only to continue growing the program, but also for the campus to become a hub of aerospace ingenuity.

Morehead President Wayne D. Andrews, in a 2006 interview with the Lexington Herald-Leader, said he envisioned the space science program helping to incubate small companies and churn out top-notch students to create at Morehead what he called "Silicon Holler."

The next big test for the program will come with the planned summer 2009 launch of the Kentucky Space Program's satellite. Morehead has been collaborating with students and faculty at the University of Kentucky, University of Louisville and several other state colleges to design and send a toaster-size treated aluminum satellite structure into orbit.

The first launch will test how that structure, which Malphrus calls a "modular bus," works so that future versions can take up research equipment for private firms and other universities.

"We're hoping to design, build and launch a new satellite into lower orbit

every 12 to 18 months because that would give Kentucky a permanent presence in space," he said.

Some experiments in the works include measuring the Earth's reflectivity - or albedo - off the moon to track global warming and assessing how radio waves move through the earth's atmosphere, Malphrus said.

But starting with the first successful launch, the satellite also will provide educational opportunities at Kentucky middle and high schools.

"With about $1,000 worth of equipment, high school students can actually command and control the satellite. And middle school students, with about $300 worth of equipment can actually track the satellite," Malphrus said.

MSU has applied for a $1.2 million NASA grant to pay for that, he said.

The hope, Malphrus said, is to establish a pipeline of eager and engaged students who then choose Morehead or another Kentucky school to study aerospace engineering before ultimately opening up shop in the commonwealth.

"We're trying to build an environment that's conducive to developing a cottage industry," Malphrus said. "It's kind of a shame that we train kids and they get really good and they have to leave to work in the field."

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