

Sucking up knowledge and light: Professor and students collaborate on black hole research

Marlena Chertock
Design Editor

Dan Evans never knew exactly what he wanted to do until college when he first saw the images from the Hubble telescope. Now, as an Elon physics professor, Evans studies one particular cosmic body — black holes.

Evans said he wants to understand the physical processes of the cosmic bodies in space, which is the focus of astrophysics.

He described black holes as enormous cosmic vacuum cleaners.

"It turns out that just as the material takes its last death plunge into the black hole, it also releases a huge birth of X-ray emission and gives off a big flash," he said.

This flash can be tracked by the Chandra X-ray Observatory telescope, the telescope he is using to conduct research.

"If I take an X-ray photograph of the night sky, we can find out what (black holes) are doing, what they're eating," he said.

Evans said he plans to use black holes to test Einstein's general theory of relativity.

"This is part of the \$3.5 billion mission from NASA that I've been working on for the past decade now," Evans said.

The funding for this project comes directly from NASA, he said.

Before coming to Elon this year, Evans worked with NASA at Harvard University and Massachusetts Institute of Technology.

"My research involves supermassive black holes, which are incredibly massive black holes," Evans said. "They have a huge amount of gravity associated with them. What I try to do with them is to understand how they work."

Evans is bringing two Elon freshmen onto his research team, Todd Calnan and Matthew Barger. A third student will start next semester.

"I really like the undergraduate

program here," he said. "I've always placed a firm emphasis on undergraduate research and it seems like Elon is really making a substantial push to put itself on the map for leading undergraduate research. I wanted to be a part of that effort."

They started the research in mid-September. In May, they will view galaxy NGC 1068 through Chandra.

Evans said the students are researching to understand how black holes flow material.

"It turns out it's actually a very complicated process," Evans said. "If we find out that, we can measure out the process of the black holes."

Calnan said he wants to get a solid foundation in this type of work, which he said he's confident that Evans can provide.

"I'm a physics major and I'm particularly interested in cosmology," Calnan said. "This type of research is what I'm going to be doing for quite some time and I thought it would be good to get a head start."

He said that he's learned to use the computer programs, which analyze data, and the basic physics of black holes.

Calnan and Barger have also learned how to program UNIX, which they use for entering data Chandra supplies.

"The point of the research is to determine how fast the black hole is rotating given certain data," Calnan said. "I also like the idea of being able to find something out that nobody else knows about yet."

Barger said he sees this research as a way to broaden his view of the world of physics.

"(Evans') presentation (on black holes) in the beginning of the year really captured me," he said. "He talked about the different situations of black holes throughout the universe. There are quite a handful of them. Each one of them has their own story. I thought that was interesting."

A certain set of principles in space applies to every single black hole in



PHOTO COURTESY OF UNIVERSITY RELATIONS
Physics professor Dan Evans is researching the physical properties of black holes with two Elon freshmen. The team will look at images from the Chandra Observatory telescope in May.

different ways, Barger said.

"Dr. Evans' research will allow you to apply the principles to all of these different black holes and see things that other people have yet to see," he said.

Evans creates a comfortable, motivating atmosphere, according to Barger.

"The way Dr. Evans presents our tasks to us makes us feel we can do it," he said. "I didn't know (Calnan) before, but (we) work well together. Dr. Evans keeps us on the same page. We started out doing the same thing, but I think Dr. Evans is trying to make it so that the tasks we're doing are slightly different than the other's work."

Evans said he tries to take his passion directly into the classroom and research. He said he wants to encourage students to take astronomy classes.

"I want to give them the training so they can embark on careers, hopefully as professional scientists," Evans said.

"I think that's a big part of the Elon experience."

He said he hopes the students will continue researching with him for four years.

"I don't take students on unless they have a lot of passion themselves," he said. "I don't take them on unless I look forward to the next four years together."

Both Calnan and Barger said they plan on continuing this research.

Evans said he wants to take students to an astronomy conference in May.

"It's not so much what I have to do, it's what they have to do," he said. "They've got to show that they have the hallmarks of becoming professional scientists. They have to do a research project at professional or near-professional standards."

Evans said he hopes to expose students to what life as a scientist is like.

"It's actually an exciting one," he said.

Environmental senior seminar group cultivates greener future

Bonnie Eford
Features Editor

Built more than 70 years ago, the Powell House was not built based on sustainability or green efficiency principles.

Perhaps that's why a group of seven Elon seniors took matters into their own hands.

As a part of their Environmental Studies Senior Seminar class, they are creating a proposal for "green" renovations and enhancements of the Powell House throughout the semester.

The class received a free energy audit from Sundogs Solutions, a company located in Chapel Hill, and has been researching different topics ranging from passive solar heating, sealing building envelope and installing solar panels to include in their proposal.

But why?

"Sustainability or 'going green' has become an important part of Elon," said Travis Counsell, one of the seven seniors working on the project. "It should be important to everyone as we cannot keep living the way we are today."

The proposal goes hand in hand with the Elon University Master Plan, which outlines plans for creating a "greener" campus.

"Our proposal will outline how each improvement of the building will benefit both the performance of the building and identity of the environmental studies department," Counsell said.

Counsell also looks to the project as a way for the Environmental Studies Department to plant and nourish their identity on campus, which he said is growing steadily.

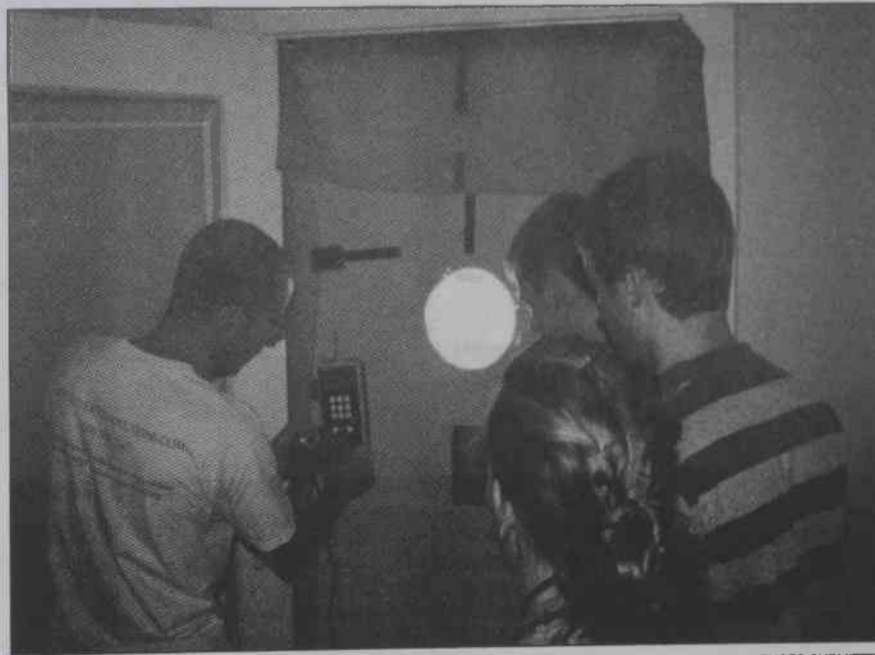


PHOTO SUBMITTED
Members of the Environmental Senior Seminar group met with those from Sundogs Solutions to walk through the Powell House during the free energy audit.

"It can be used as a model for a more sustainable future," Counsell said. "With the community garden next door, and plenty of potential for the house, all we need are motivated individuals to keep pushing forward."

The class is not actually performing the upgrades on the Powell House, though, but is merely writing up the proposal and researching how best to retrofit the building in the case that the university decides to do so.

According to Counsell, the retrofitting process begins with evaluating how the building is currently performing relative to sustainability standards.

In order to do this, the group asked Sundogs Solutions to perform an energy audit. They agreed to do it, and did it for free.

"The report Sundogs Solutions gave us has been very helpful throughout our proposal," Counsell said.

Those from Sundogs Solutions spent three hours walking through the house with members of the group to create the report for the audit.

The audit consisted of a blower door test, which measures how leaky the house is, thermal imaging to locate the leaks and a visual inspection to find additional problem areas.

"Let's just say it was very leaky," he said. "If all of the cracks were

put together it would be like having a three foot by three foot hole in the side of the house. So, the obvious first step to a retrofit would be to better insulate the house and seal all of the cracks."

Although it seems they have their work cut out for them, Molly Schriber, another senior working on the project, looks to the project as an opportunity to give back to Elon.

"As seniors in a capstone course, it also allows us to express our ideas on what we would like to see our department evolve into as it is still fairly new to Elon," she said. "It would allow us to show some of what we have learned throughout our degree, and start rolling the ball to put it into action."

Other seniors in the group creating the proposal are Jared Balavender, Taylor Foshee, Alex Kuhn, Jesse Lee, Katy Magruder and Molly Schriber.

Each person in the group focuses on a different aspect of retrofitting the Powell House, and then combine their findings and individual topic proposals into one complete proposal. Counsell focused on the sealing the Building Envelope and having the Energy Audit performed, while Schriber focuses on the potential of wind power for Powell House.

Through their collaborative efforts, they all share two common goals: to create an identity for their department and create a greener future for Elon.

"Environmental Studies students are different from other students on campus," Schriber said. "We think a little differently; therefore what better way to visually show this to visitors and the rest of the university. While the building will still hold southern brick flare that Elon embodies, it will visually show our uniqueness."