

RU Physics/Physical Science Alumni Newsletter—Spring 2010

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RU Physics News

We here in Physics are excited to let everyone know about our new concentration within the Physics major, the Physics Education Concentration. This concentration is specifically geared towards students who want to take their physics degree into the high school classroom. This new concentration will have its first graduate in May. Kathleen Abrell Melgarejo is the first to complete this concentration. She and her husband Jose will be moving to the Houston area this summer where he has a job. Kati is already taking an online course to get her provisional teaching certification in Texas. Kati has helped teach a number of labs while at RU and really enjoys teaching. She has also enjoyed helping with our Science Day presentations to visiting K-12 classes.

RU Science Days

Many of you know about our planetarium. The homemade dome was built in 1971, the original seats and carpet came in 1975, and the Goto SG-8 star projector came in 1979. By the late 1990s it was a small-but-somewhat-functional, white-walled, no-frills, in-need-of-repair planetarium, but a working planetarium nonetheless. Over the ensuing years a number of upgrades have come to the planetarium through hand-me-down equipment, duct tape and nails and paint, a few show donations and a lot of elbow grease. Attendance grew steadily through public shows and through groups requesting special showings.

We began to set up one of our telescopes with a solar filter for the visiting school groups to add to their experience. We added various physics demonstrations and activities to the mix. Then the chemists came on board and offered shows for the groups. Eventually we some geology and biology activities were incorporated into these visits.

In the past few years these days with large visiting groups became huge productions. In 2004 we formed the Radford University Science Alliance. This group is coordinated by Dr. Herman and works to bring as many school groups to campus as possible. The Science Alliance coordinates the groups and we schedule in as many as possible throughout the year. So far in this academic year we have hosted over 1,100 K-12 students and faculty, with several more groups scheduled before the 2009-2010 academic year ends in June.

Arctic Sea Ice Research at RU

From February 26-March 13 Dr. Herman took a total of 9 RU students and one local high school teacher to Barrow, Alaska for two weeks of intensive arctic sea ice research. This was



Trevor Twyford (Physics, '09) entertains Science Day group using Bernoulli's Principle. The hovercraft is the black circle behind Trevor.

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the third such research class—the other two were March 2006 and March 2008. This Selected Topics class was again Physics 450—Arctic Geophysics. Dr. Herman and four students stayed for both weeks, with 4 others joining them the first week and 2 others the second.

The first week had Dr. Herman and 4 full-time RU students being joined by Dan Blake (RU, Earth & Space Science, '05), physics teacher at the Southwest Virginia Governor's School in nearby Dublin, along with 3 of his students who dual enrolled in this class. As many of you recall it was Dan's initial interest in polar regions that sparked Dr. Herman's own interest in such research.



Left to right: Gaven Burnett, Biyuan Zhao, Jason McLarty, and Ashley Taylor use the OhmMapper resistivity array and the GPS backpack unit.

Dan and his three students had primary responsibility for thermal measurements on the sea ice. The goal of this was to



Jason McLarty (red coat, Physics, December '10) and Jeremy McLaughlin (Physics, December '07) work with the GPR cart and the GPS backpack antenna on the ice.

that the measurements might eventually be acquired. They were in a sense, but only at the end of the second week. Due to the protocols developed the data was acquired but it will take a lot of work to extract it from the raw data. Dan and his students are (as of this writing) working to extract the final data from the raw data.

In addition to the thermal data the team deployed ground penetrating radar, electrical resistivity equipment and state-of-the-art GPS equipment on the ice. A great deal of data was obtained and the data analysis will be ongoing throughout the coming year. However preliminary results include the fact that the underside of the sea ice is more dynamic than we had thought. Resistivity images taken over the same survey line over the course of the two weeks clearly showed how the ice/water boundary changed from one day to the next. The team obtained GPR data over a 20-meter by 100-meter grid that will allow for

investigate a possible correlation between the temperature of the ice surface and the thickness of the sea ice. These measurements proved to be particularly difficult due to a limited number of digital "thermochron" thermometers, programming them to properly acquire data, problems with the time to thermal equilibrium, electromagnetic interference from the other equipment the group was using, and a host of other issues.

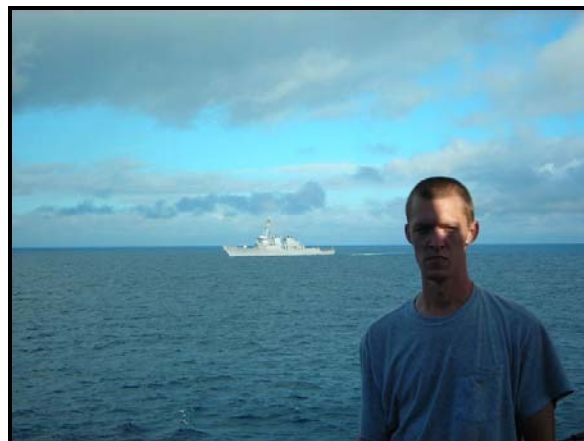
Throughout the week this group worked to develop the protocols necessary for acquiring the temperature data. They eventually trained others in the two-week group in the use of the thermochrons so

unprecedented 3-D imaging of the ice.

Alumni Spotlight—David Stewart (Class of 2002)

Dave Stewart is a civilian employee of the federal government at the Naval Surface Warfare Center in Dahlgren, Virginia. We caught up with Dave recently and asked him a few questions. First, his description of what he is currently doing:

My job title is 'electrical engineer', but in my work I'm really more of an RF (radio frequency) engineer. I work at Naval Surface Warfare Center in Virginia so I'm a federal employee. My group ensures that any system that goes on a Navy ship that transmits or receives RF energy operates correctly as far as electromagnetic compatibility. This means that signals intended



to be received by some other system do not enter an unintended system and blind it to what it's really looking for. There are various mechanisms of interference such as power coming through an antenna or power going right through the shielding on a system and coupling directly onto electronics inside it. Usually the work is fairly simple, but sometimes we will get into things you have to have gone to school to be able to figure out. We really need to know Fourier Transforms for example; what a time signal will look like in frequency.

We asked him what was really cool about his current job:

The travel: I've been to San Diego about 6 times, Fort Worth Texas twice, Mayport Florida, Corpus Christi TX, Japan twice, Bahamas, NY, Washington State, Wallops Island, etc.

Opportunities: I volunteered to work in Iraq for four months. I worked with a USMC Colonel, Navy Commanders, and young Marines at Camp Fallujah. I could go to Afghanistan now if I wanted; engineers representing the government's interests are needed badly.

Going out on ships: Very few people get to go out on US Navy ships, especially when they go out to sea. We do both regularly. We get to see how our Navy really operates and we see what it's like to live on a ship (it stinks).

We asked how his RU degree helped him to get his current job.

A physics degree looks good to a lot of people for a lot of different jobs. Having a MS in EE also helped me a lot. For more versatility, just be sure to learn two things in

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addition to Physics: programming with Matlab or C++, and some electronics.

(We have taken this advice and now offer a “Numerical Methods in Physics” class.)

Dave’s response when we asked if someone with just **any** degree could get:

No. Our group hires Physicists and Electrical Engineers. There is a Physics PhD downstairs and about five other Physics degrees in my building; making about 6 out of 70. Everyone else took Electrical.

Dave does have plans for the future:

I’ve been here at Dahlgren for four years. I plan to be here for another 6 months, and then I’m leaving to do something non-technical that I want to finish during my lifetime.

Finally, we asked the all-important question: Would you recommend RU and your specific degree choice for a high school junior/senior?

I definitely recommend Physics at RU. The atmosphere at Radford is much more relaxed than other schools, so that you actually have a chance of enjoying your learning instead of feeling like a slave. You can learn as much as you have the motivation to learn at Radford. The professors are helpful and at least one of them is almost always available to answer a question; this is not the case at other schools.

He also had some useful advice for RU Physics grads:

When you graduate, I would also take the GRE and Physics subject test even if you don’t plan on going to graduate school; so you can put results on your resume if you choose.

Good advice from someone who has been there.

Don’t forget our Physics Faculty/Alumni Scholarship Fund. You can donate to this fund at <http://www.active.com/donate/ruphysics>. Note that some \$\$ amounts are more ‘fun’ than others for your donations!

PS—Let us know how you are doing! Please email Dr. Rhett Herman (rherman@radford.edu) with an update. We would love to hear from you.