

SPS at Green Bank  
with Alumni

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McCaughan

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Augmented Reality  
Sandbox—A Work in  
Progress

Interdisciplinary  
research team goes to  
Alaska

New Graduates, etc.

### SPS and Alumni at Green Bank

On the weekend of January 23-25 the RU Society of Physics Students (SPS) joined 6 RU Physics/Physical Science alumni for a weekend at the National Radio Astronomy Observatory at Green Bank, WVa.

Everyone participated in various observing sessions using the 40-foot-diameter teaching radio dish. But the current students also had a great time mixing with and hearing about the career paths of the alumni. The SPS will likely have more of these alumni events in the future since this was such a success.



### Mike McCaughan Talks about His Work

On February 6, RU Physics Alum Mike McCaughan ('07) gave a talk about his work in the Accelerator Ops, R&D Group at the Thomas Jefferson National Accelerator Facility in Newport News, VA.

Mike's talk discussed the facility itself, its operation, and some of the experiments in which the lab has presently and historically engaged. He talked especially about his own work running a relativistic electron beam, and the physics involved with the beam. He answered a number of students' questions both during and after the talk. Afterwards, Mike went with many in attendance to local hangout MacAdo's.

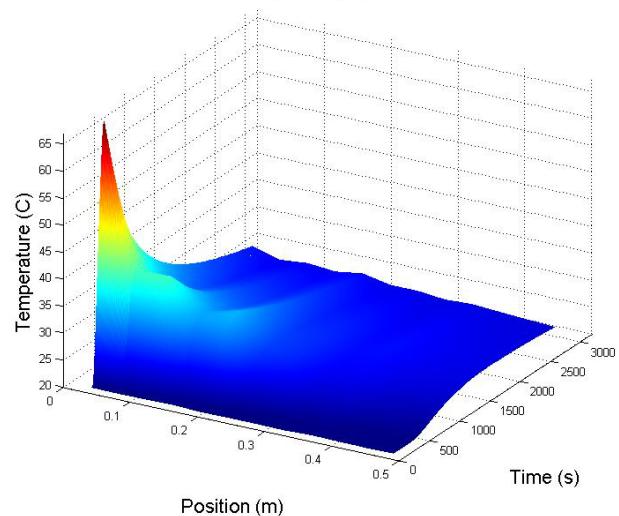
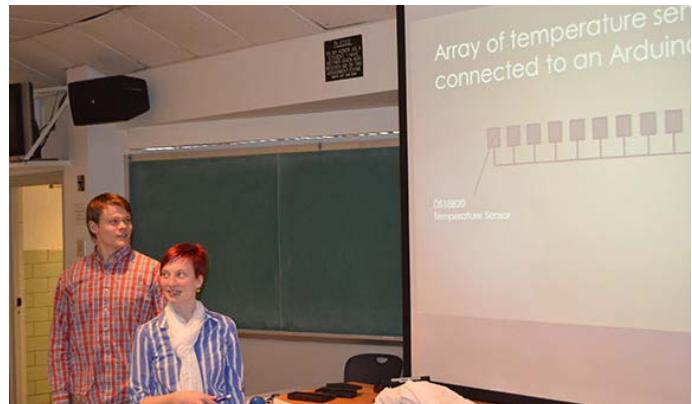


### Students Present at AAPT Meeting

Two students presented their work on their Honors projects in the Fall 2014 PHYS 330—Thermodynamics and Statistical Mechanics class at the Spring Meeting of the Chesapeake Section of the American Association of Physics Teachers. The meeting was held at the University of Virginia. Their talk was titled “Measurement of Thermal Wave Propagation in Aluminum.”

Abigail Ballowe and Joe Ashley presented their experimental design and the results from their measurements of the speed of a thermal wave in an aluminum bar. Their design employed 12 DS18B20 temperature sensors and used an Arduino Uno microcontroller to acquire the data. Their results showed the initial pulse from a Bunsen burner traveling along the half-meter insulated bar. Their results matched the theoretical heat-flow equation extraordinarily well. The second image at the right shows the initial pulse having  $\Delta T \approx 45C$  and moving along the bar.

Abigail and Joe are working with Dr. Herman to get the design, method and results written up and submitted soon for publication in a peer-reviewed journal.



### The Augmented Reality Sandbox Project

Geology Major/Physics Minor Cameron Baumgardner built an “augmented reality” sandbox for part of an Independent Study project this spring (2015). This project arose after seeing a demonstration at the Fall Meeting of the American Geophysical Union. This project is from a design from the U. of California—Davis.

The sandbox uses a Kinect game sensor and free linux-based software to sense and analyze the location of points that make up the surface of the sand. A short-throw projector then displays contour lines and colors onto the sand that match those locations. As users dig in the sand, the contour lines and colors adjust in real time. Users can also hold their hands above the surface and the software will make it rain.



You can check out videos and more images of the augmented reality sandbox on the RU College of Science and Technology Facebook page. Or google the words “augmented reality sandbox Radford University” and you will find the page.

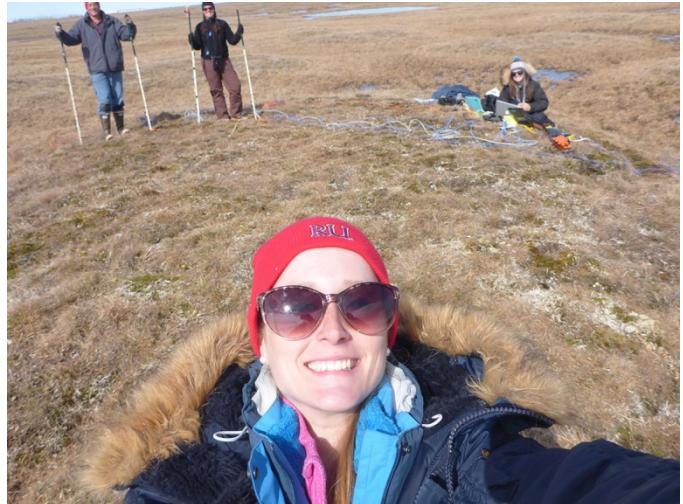
### Physics and Biology Research Team in Alaska

In June, a 4-member team went to Barrow, Alaska for a project to study the microclimate factors that influence the behaviors of migrating birds that nest on the tundra. Drs. Herman and O'Brien had received a College of Science and Technology Excellence in Research grant and recruited physics major Jordan Eagle and biology major Maddy King to help with the work.

The microclimate sensors were designed and built in a frenzy in only 4 weeks after the end of the 2015 spring semester. They were based on the Arduino microcontrollers, and employed DS18B20 temperature sensors, DHT humidity/temperature sensors, RGB light sensors, and Vernier anemometers. The sensors were mounted on metal fence posts using power buses scavenged from the Electronics Laboratory breadboards that so many of you have used. One “mothership” post had all of the sensors while 3 other posts only had the temperature sensors (15 temp. sensors on each post). The group acquired a **lot** of data, enough for even a Master's thesis! The group will be analyzing the data and perfecting the design in preparation for publication.



Dr. Sara O'Brien (left) and Jordan Eagle (right) holding the just-assembled “mothership” post in the Barrow Arctic Research Center, the group’s staging site. Maddy King works on more wiring and programming behind them. Note the wires strewn about this conference room—the group was fortunate to have this place to assemble the sensor posts after traveling to Barrow.



*Jordan Eagle took a group selfie showing Drs. Herman and O'Brien holding the sensor posts while Maddy King runs the computers. Note the scavenged CAT5 wires on the tundra—due to the short turnaround time for the design and assembly, the Arduinos were sitting on the tundra right next to the computers, and the posts were connected to the Arduinos via these CAT5 wires. The group will significantly refine this prototype in the coming year for future research deployments.*



*Pictured above are Dr. Sara O'Brien (Assistant Professor of Biology), Jordan Eagle, Maddy King, and Dr. Rhett Herman. This picture was taken on the north polar ice cap just offshore of Point Barrow, the northernmost point in the United States. As with all trips to the Arctic, this type of tacky-Hawaiian-shirt group picture **must** be taken! ☺*

## The New RU Planetarium

A quick final note about the soon-to-be new-and-improved Radford University Planetarium: The interior of new planetarium—the projector, the dome, the interior lights, and the computers to run everything—are being installed by Evans & Sutherland (<http://www.es.com/>). This will happen in the second half of August, and will take approximately 2 weeks.

We will have a new Digistar 5 projector, the world's best-selling, all-digital, full-dome planetarium projector. The new dome will be 10 meters (33 feet) in diameter, a big step up from the current 24-foot diameter dome. We know the current planetarium has served long past its planned lifetime, and has handled a workload far beyond its original design. In fact, by the end of this coming fall semester, it's likely that we will pass a grand total of 40,000 visitors to the RU Planetarium since public shows started in October of 1999.

We plan on having a "de-commissioning" ceremony for the current planetarium sometime late this fall or in early January. We will also have a separate "Grand Opening" of the new planetarium in late April of 2016 (even though it will be running before then, this is the formal launch). You will all be informed and invited when we know the dates for both of these events.

## New Graduates, More Graduates in the Future

Five more students joined the ranks of RU Physics alumni in May, joining the three who graduated in December. For those of you who graduated some time ago, you might be interested in knowing that we have averaged nearly 9 physics grads per year over the past 6 years. Our numbers are continuing to increase. Stay tuned for more details on our strategic plan for continuing to grow.

## Contact Us

*Let us know how you're doing, what you're doing, and where you're doing it!*

Dr. Brett Taylor (Chair)	<a href="mailto:btaylor@radford.edu">btaylor@radford.edu</a>
Dr. Walter Jaronski	<a href="mailto:wjaronsk@radford.edu">wjaronsk@radford.edu</a>
Dr. Rhett Herman	<a href="mailto:rherman@radford.edu">rherman@radford.edu</a>
Dr. Jack Brockway	<a href="mailto:brockway@radford.edu">brockway@radford.edu</a>
Dr. Shawn Huston	<a href="mailto:shuston@radford.edu">shuston@radford.edu</a>
Dr. Mythianne Shelton	<a href="mailto:mrshelton@radford.edu">mrshelton@radford.edu</a>
Mrs. Libby Watts	<a href="mailto:lwatts@radford.edu">lwatts@radford.edu</a>
Mr. Dan Blake	<a href="mailto:dblake@radford.edu">dblake@radford.edu</a>

## Light: Beyond the Bulb

We will be hosting an exhibit from the Smithsonian Astrophysical Observatory called "Light: Beyond the Bulb" in January, 2016, as part of the International Year of Light: <http://lightexhibit.org/> You can see our site listed for this exhibit, as well as perhaps another exhibit located near you: <http://lightexhibit.org/iylexhibits.html> You are all invited to come by and take a look sometime when the exhibit is in the new Center for the Sciences building, between January 11-29, 2016.

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