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Four undergraduates (Wesley Clawson, Zachary Ritchie, Jordan Stone, and myself) and two professors from the University of Arkansas (Gay and John Stewart) attended the 2012 PhysCon in early November. It was held in Orlando, FL and included exclusive tours of NASA facilities. Hundreds of students, scientists, and guests from all over the world attended the three day event.

I'd like to start with a story from the trip.

Eight or so of us sit around one of the many plush tables in the Caribe Royale Ballroom. More than eight hundred of us are sitting around all the tables, and we are playing a very uncomfortable game of pretend. The game we are playing is called Balance the Budget, and our referees are David Mosher of the Congressional Budget Office and Anna Quider of the State Department. Mosher says (I paraphrase), “The instructions in your packet say that you will be given thirty minutes to make your decisions. But in the interests of realism, you instead have twenty minutes.”

We are playing the parts of the US Congress, and we have twenty minutes to decide what gets the axe. Because we have failed to avert the fiscal cliff, we must cut millions of dollars from government-funded scientific research. Do we cut everything by an equal percentage, or do we play favorites? Sacrifice better weather tracking for gravitational astronomy? Solar cells or biotech? Teacher training or materials research? Better think fast. The clock is ticking.

We have ten scientific agencies, each with their own projects, to work with, so we decide to assign one or two to each person. The questions immediately begin. We ask them hurriedly across the table and per-
form utilitarian calculations. Can we shift this to the private sector? What will provide the greatest return on investment? What can I not bear to cut?

Worst of all is the ignorance. We are attending PhysCon, and statistically that speaks well of our abilities and aptitudes. If we do not have our fingers constantly on the pulse of scientific development, we are at least sticking our arms in the blood-pressure machine from time to time.

We have no idea what we’re doing.

We dissect acronyms for clues. We guess how useful something will be by looking at which agency it comes from. We make decisions quickly and imperfectly. There are no project descriptions, and even if there were we don’t have time to understand them and argue their merits.

The refs call time, and we transmit our results via the smartphone app we’ve been instructed to use. Our table has left just about every agency equally miserable. The NSF gets a pass, because, hey, most of us are here due to its largesse, but NASA, which we toured just yesterday, takes a lashing. When the collective results are calculated we find that the James Webb Telescope Project has suffered greatly at our hands. Less than two hours ago we were listening to James Mather extolling its virtues at our second plenary talk. There is a communal sympathy for the senior project scientist, but our decisions are made.

And so we discover that this is what it’s like from the outside in. According to Bill Foster, former physicist and member-elect of the US House of Representatives, even a generous definition of the term scientist would only encompass 4% of Congress. It remains to be seen how they will react to the same challenge.

The theme of the Sigma Pi Sigma-sponsored 2012 Quadrennial Physics Congress was “Connecting Worlds through Science and Service.” The conference continued an ongoing narrative, one that successive generations of University of Arkansas physics students have been part of. In 2004, they stood on the atom-forged glass at the Trinity Nuclear Test Site during the Albuquerque conference with its theme of “Heritage and Promise.” They walked the halls of Fermilab in 2008 to the tune of “Scientific Citizenship.” In 2012 we gathered to continue the story.

I draw now from the program:

The idea of scientists . . . conjures up visions of solitary individuals set apart from society . . . But this period, if it ever really existed, has long passed . . . There is no way we are isolated - from other scientists or from the world at large.

This then leads into my favorite question. “How are the expectations and responsibilities of scientists changing?”

The talks and workshops brought various perspectives to our inquiry. Former astronaut John Grunsfeld “the Hubble Repairman” talked about his history with the telescope and its role in connecting science, public policy, and citizens. James Stith’s workshop “Connecting Diverse Perspectives in Science” helped us examine the problems of gender and ethnic diversity present in our professional culture. The renowned, happily heretical Freeman Dyson asked if four scientific revolutions—space, genomics, nuclear energy, and computing—had improved human welfare (mixed, mixed, failure, and success he concluded). These were but the most memorable events.

Exhibitors filled the display hall. National laboratories, professional organizations, and universities evangelized and recruited. Judges critically examined both art and research submitted by participants. Our own Wesley Clawson and Jordon Stone presented at the poster session: “Evidence for Criticality in the Visual Cortex of Turtles” and “A New Observation of the Quiet Sun Soft X-ray Spectrum” respectively.

Jocelyn Bell Burnell, discoverer of the pulsar, closed out the ceremonies with an amusing talk about the imminent end of the world. As her wry brogue debunked one doomsday scenario after another, I wondered how many counterpart conferences there were: places where the attendees were presently arguing the merits of the Mayan calendar, Edgar Cayce, or Nostradamus for predicting Armageddon. Burnell ended on a sober note, speaking of the appeal such theories hold and the difficulty of discrediting them. It was an apt finale for a weekend whose message encouraged us to stretch science further than the department door.
Wesley Clawson presenting his research at PhysCon 2012. Photo by Dr. John Stewart.

Jordan Stone presenting his research at PhysCon 2012. Photo by Dr. John Stewart.
Countdown sign at NASA. From left to right: Wesley Clawson, Zachary Ritchie, Caleb Heath, and Jordan Stone. Photo by Jade Dedeaux (Xavier University).

Dr. Gay Stewart at NASA. Photo by Dr. John Stewart.
Physics Library Tips for Students

by Jennifer Stabach

If you’re a physics student, it’s likely that you’ve spent some time in the physics library…or likely, a lot of time. However, you might not be aware of all the ways the library can make your academic life easier.

The main room is perfect for group work, but for students who get distracted easily, there's a quiet study area. Just walk into the library, turn left, and enter the back room to find a secret stash of study tables.

Now, I don’t want to admit it, but there are times that I don’t have the motivation to walk up the hill to get to Mullins Library. Luckily, you can request that a book be delivered to the Physics Library, and you can return books from Mullins to the Physics Library. To request a book, just let a Physics Library staff member know, and you will receive a confirmation email when it’s delivered.

Life gets even easier. The Physics Library staff can scan articles from the print collection and send them to you within 24 hours, Monday - Friday. Also, there's an inter-library loan program to help you check out books from other libraries; this takes a few days to a week. Go to the Library’s homepage at http://libinfo.uark.edu/physics/, and then click Interlibrary Loan on the toolbar. You will need register for an ILLiad account to place these requests.

While you are at the library’s homepage, check out two great features – LibGuides and Ask a Librarian. LibGuides are class, topic, and resource guides developed by librarians at our University. For example, there is a physics LibGuide, which includes links to physics journals, professional organizations, and key databases. Ask a Librarian is another online feature that connects you to a librarian who specializes in a particular subject—did you know that there is a librarian on campus for nearly every subject?

So, let’s say you’ve used the library and gathered all your research materials. The library will take you one step further and help you with a bibliography. Visit the main library page at http://libinfo.uark.edu/, and click on Research Help, then Citing Your Sources. If you need further assistance, Physics Library Head Kathleen Lehman can walk you through bibliography resources.

When you graduate, if you still can’t get enough of the Library’s resources, you can get a free membership by becoming a member of the Alumni Association, or you can become a “community borrower” for a small fee.
Stephanie Freedle (Physics Library Supervisor), Will Lewis (2012 BS graduate), Kathleen Lehman (Head, Physics Library)

Mark Bush enjoying Halloween in the Library.

Silent study space in physics library.
HAUNTED PHYSICS LAB

The annual Haunted Physics Lab was a great success! Each year the Society of Physics Students (SPS) hosts a community event near Halloween for kids, teens, and those young at heart to participate in an afternoon of fun physics events. This year, an estimated 300 people attended and enjoyed activities such as liquid nitrogen demonstrations, the Van de Graaff generator, and making magnets. Our volunteers received many thanks from happy parents.

A special thanks to Zach Callahan and Kendal Dix for managing the event; Mark Bush, Christine Stith, Gabby Abraham, Justin Norman, Alex Martin, Kendall Dix, Ryan Nakamoto, Jordan Stone, and Bailey Knapp for three hours of demonstrations; Kat Stewart and Hannah Shameh for gallons of liquid nitrogen ice cream and bags of frozen Cheetos; Zach Callahan and Gabby Abraham for liquid nitrogen demonstrations; and Jennifer Stabach and Caleb Heath for decorations.
One of our undergraduate students, Mathias Bellaiche, has been studying abroad this semester. I caught up with him to learn more:

**JS:** Tell us where you’ve been this semester.

**MB:** Since October, I’ve been at Girton College of Cambridge University in the UK.

**JS:** How long are you staying for?

**MB:** I’m staying until mid June.

**JS:** Can you explain your program and how you applied for this opportunity?

**MB:** The program is an exchange, albeit unilateral, coordinated by Fulbright Honors College; participants go to Cambridge for a year to take classes towards their major. I applied first to Fulbright Honors, and then my application was accepted by Girton College.

**JS:** What classes have you taken / are you taking?

**MB:** Physics-wise, I have taken electromagnetism, experimental methods, math methods, oscillations, waves and optics, and classical dynamics, and I’m currently taking thermodynamics and quantum physics. In chemistry I’ve taken introduction to quantum chemistry, molecular spectroscopy, and symmetry and bonding, and the current course is an introduction to statistical mechanics.

**JS:** What are your classes like?

**MB:** We have lecture six days a week which are totally impersonal. Everyone taking the same course in the university piles into a lecture hall, meaning there are about 100 or so students in every lecture. Then three times a week (one for each course) we have supervision, where two or three students meet with a professor and we go over homework problems that we’ve been sent that week and any questions we have over the material. Then we have practicals eight hours a week for physics and four for chemistry. It’s definitely a lot of work, but mostly because they cram so much stuff into such a short time. Another of the major differences with the U of A is that here you just choose “physics” or “chemistry,” and the exact courses that you do are predetermined, as opposed to choosing each of your classes every semester.

**JS:** What’s been the most interesting aspect of your coursework?

**MB:** I think I’d have to say supervision. I find that they’re a great way to learn, and the one-on-one time with a professor really helps with any difficulties I have with the material.

**JS:** What do you do for fun?

**MB:** I’ve picked up rowing as a sport, and it’s loads of fun! The River Cam is picturesque, and being outside doing stuff other than studying is a great and needed break. Besides that, I hang out with the friends I’ve made here, and I travel a bit.

**What’s your living situation like?**

**MB:** Cambridge is made up of about 30 different colleges, and each acts as a sort of community for its students. Most students live within their college, so I live in Girton (which I just learned is technically classified as a castle!). The rooms are all singles, but arranged on long corridors so it feels like being in a dorm. I really love Girton, but the only thing is that it’s the furthest college from the city centre, so I have to cycle about five miles a day to get to and from lectures/practicals.
JS: Have you had a chance to travel?

MB: Yeah! Over winter break I had the chance to go to France to see my family, which was great because it had been a while since I had last been there. Then this term I met up in Luxembourg with another U of A student who’s studying abroad in Edinburgh, and last weekend I went to London with an exchange student from MIT and saw the British Museum and Covent Garden, one of the big markets there. I’m planning on going around Spain and Italy during spring break too. Everything is so much closer in Europe, and traveling across countries is so much cheaper than flying within the U.S.

JS: How has this experience changed your outlook on physics and your future goals?

MB: Taking a whole year to do nothing but physical science has unified my view on the subject, and it’s made it easier to draw connections and identify common themes between different areas of physics (for example the almost direct application of electrostatic techniques to fluid dynamics). I still want to go into systems biology, but I feel like I better appreciate the relevance of all the realms of physics.
Congratulations to physics undergraduate students Liz Brittain & Brandon Childress who welcomed baby Gordon Carver Childress on 12/12/12 at 9:33 pm!

Gordon was born 9 lbs 1 oz and 22 in long.

Congratulations to Wesley Clawson who won 2nd place in the physics oral competition at the Arkansas INBRE Research Conference!

This annual conference includes colleges and universities from Arkansas and surrounding states and involves participation from biological sciences, physics, chemistry and biochemistry.