ACU Department of Engineering and Physics
Weekly Summer Research Newsletter

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DANGO (Doings and Goings On)

Updates from the Students

From Ramsey Towell:

What it do DANGO,
This week we finally finished being on shift at PHENIX for Run 13 of RHIC which means we will have our first real weekend! Also, my dad and Dr. D left us to fly back to Abilene so we have been given a number of tasks to keep ourselves busy with until my dad returns. Our main goal we are working towards right now is trying to get the high voltage from all of the good, physics runs from the PHENIX database and find the efficiency of the Resistive Plate Chambers (RPCs). So for the most part we have been looking at other people's code trying to decipher how it works so that we can use it as well.

Besides us pushing back the bounds of science, nothing much else has happened other than complete domination on League by Team BNL. I can't say that I'm surprised that no one from Fermi or anywhere else has friended me after seeing the havoc we are wrecking online. But if anyone would like to accept our challenge, give me a call.

–Ramsey

From Andrew Miller:

Hello again Dango!
This week has been interesting. We didn't get a break last weekend, because of the shift we were working, so we are all looking forward to our first real weekend! The Doctors both left on Wednesday, and Dr. Towell won't be back until next Sunday, so we have another week of work to keep ourselves busy with.

These past couple days we have been listening to talks and reading through code by several people in order to get an idea of how to access the PHENIX database. One of our first tasks will be to sort through the data and find out when the high voltage for the RPC detectors was on so that we can make measurements of their efficiency.

There has also been quite a bit of League of Legends in the evenings, and there have even been a few games during lunch. Otherwise, things have been pretty uneventful, so I don't have a good photo of the week for this week.

Until next time,

–Andrew

From Ryan Pinson:

This week was quite a change. Tuesday was the last day of shifts that the ACU group was scheduled for and so we moved on to other things. After learning a lot from the shifts I am looking forward to a more project oriented work schedule. We also said farewell to Dr. Daugherity who was moving to his next destination, and also to Dr. Towell until he returns in a week or so.

The main work we have been doing is learning as much as possible about the PHENIX and the detectors and the project which we will be working on. Mainly I have been learning as much root and scripting as I can so that I will be able to keep up once we have to start digging into the main summer projects. As the same we have done some cleaning up in the factory building that has

been used the past in the past few years.

In other news, I have now been to get Carlos and had the stuffed crust pizza which is profound and weather has been amazingly cool and fabulous. Also I hope all of y'all enjoy the photo Ramsey and I acquired. I'll catch up will y'all next week.

–Ryan Pinson

From Marshall Towell:

What it is Dango.
So this week was our first week we got to do some work that didn't deal with shift. Mostly I have been trying to learn and operate the terminal so hopefully I will be able to navigate through it easily next week. We also went to the factory and helped clean it out and turn on some old computers and try to get them running. Yesterday I played basketball during lunch with some other people on the lab which was pretty fun since I haven't played any in the last couple of weeks. Tomorrow will be the first day since we've gotten here that we get a chance to sleep in so I'm looking forward to that. Well that's about it. Until next week Dango.

–Marshall Towell

From Francisco Teran:

This week was a great for me and for the team. During the first 2 days we were able to do a lot of things. Erik has been working on this motor for the lenses, so I and Dr. Head don't see him a lot. On Thursday I built a computer with the help of Dr. Head. On Wednesday Dr. Head and I started working on installing Linux. We were able to install but we failed on making it boot I the right way. On Thursday Dr. Head gave the task of designing a holder for the crystal sample we are using for the experiment. I was able to design a model really fast, but my joy didn't last very long. When I tried to open the model on Maker Ware to print it I realized that the file wasn't compatible. After doing a little research I found out that it needed a .stl file in other to be able to open it on Maker Ware and Print it. Finally on Friday I was able to create a .stl file and I was able to open the file on Maker Ware. Everything looked right and ready to print, but I was wrong. The printer wasn't able to print my model in the right way. We were getting shapeless objects from the printer. I worked all Friday trying to find the right way to do it. The last print on Friday was promising but not close to what the real model looks like. I am going to be working on being able to print a perfect model next week.

–Francisco Teran

From Erik Forrister:

On Tuesday, our research officially kicked off. We started by cleaning and gathering the tools we might need. Then we started working to upgrade the lab. I was put to work on building a better focuser, a project I had started in Instrumentation lab last fall. Using a stepper motor, PIC Microcontroller, and my own driver circuit, I am assigned the task of creating a device that will move a lens accurately to a desired place. Before this summer, I made the driver circuit and some programs that could move the lens continuously, but I could not get the motor to stop on its own. So, this week I have been working on that. I wrote a program that should work, but for some reason, it does not. The wheels just won't stop turning. I worked for many hours just trying to debug my code. I did lots of research on how the programming language (Assembly) works, but I still couldn't figure out what was wrong. Then today, Dr. Head showed me a website that allowed me to download a compiler that would allow me to program in another language (C). So I spent today trying to figure out how to program the Microcontroller with this new language. This was like walking into an new world; I don't know yet if it is good or bad. But, I think

this new language will end up being better for the other components that I need to incorporate into the code.

All in all, this week has been alright. Progress has been really slow, but I'm learning. Although my colleagues and I are working on different projects (all of which have had problems), I still feel like an important part of the team and I look forward to when it all comes together nicely.

–Erik Forrestor

Fermilab

From Lacey Medlock:

Hi,
This week, we did more of the same type of thing we did last week. We did more training and we looked at the hodoscopes again. I'm looking forwards to getting an assignment that will last for the rest of the summer.

Have a good week,

Lacey

From Elizabeth Carlisle:

Hi everyone,
This is the end of my second week here at Fermilab. Last week was mostly training and stuff like that, so this week we were doing more actual work. We tested all of the hodoscopes and then looked more closely at the ones that didn't seem to be working as well. Fortunately, Mrs. Isenhower got here this week and has been making delicious dinners for us. It's nice not to have to worry about cooking anymore. So it's been a pretty good week.

–Elizabeth

From Noah Kitts:

Hey everyone!
This week we got more of an idea on what we will be doing this summer. I started doing some testing for the beam monitors that I built last summer, and I will continue testing those to see how they compare to some new hodoscopes that Chuck Brown wants to use instead (He says they'll be better than mine though we will see about that). Outside of work I have been enjoying the magical pizza that exists only near the presence of Chicago. I hope everyone is having a great summer.

–Noah Kitts

Updates from the Professors

From Dr. Donald Isenhower:

Dear all living in DANGOland,
Today I took Shon to the airport. It's been good having him here, plus now he's got all the safety training to come take shifts later in the year. We definitely have enough tasks to keep 5 students busy. While lots of things are ready for our upcoming run, lots of things are not. I've spent my time working on the presentation we have to make in DC (To designate citizenship we have used "PHENIXian," and "DANGOite," but it is probably not good to use "SeaQuester" as being what those of us at Fermilab can be called), going over what things need to be done this summer by us, and why the discriminators for the hodoscopes got set to -250 mV. Nobody admits to changing them to this, and if they really were at this level during our 2012 run there should have been major issues with the trigger that I don't remember ever seeing. We didn't do any of the setup of the electronics downstream of our patch panel for hodoscope signals, but I won't make the mistake of assuming people have properly set things like thresholds and widths as they do the DAQ/trigger this time. The 2012 run did prove that we do need to put what are called "clip-lines" on all hodoscope PMTs to shorten the pulses. We will be helping with the ones for stations 1 & 2 as well as our station 3 and 4 hodoscopes. Making these will get distributed so that nobody gets stuck doing all 400 or so. There should be over 160 already made for the old E866 detector, but we've only located about 20 of those.

In addition to Shon, I think all the students

here now have the training here to take shifts as well as work. We can invite the UIUC group up when it's time for UIUC to bring the station 1 hodoscopes back up and install to mix fun with pleasure and pain. Another thing we might want to plan for those in IL is a trip up to the NOVA Far Detector in Minnesota. The Technical Director for its construction is a good friend and it turns out that Oshay (sp?) at church is working on it, so we have two very good ties to get us in for a good tour.

Below I submit my "Photo of the Week" entry. If you don't get it, you've never walked or ridden a bike near a nesting goose or near them with their little goslings running around. These web attacks can be painful! Actually there have been at least three cases I know of where a "web attack" has required system repairs. One person had to have stitches, another had a few injuries incurred in their attempt to get away from their attacker. I hate geese.

–Dr. I.

From Dr. Josh Willis:

Hi Dango,

This week was my first full week in Germany, after some travel delays in getting here the week before. As several key people I work with in the group were away one of the tasks (PyCBC development) that I had hoped to get started on will have to wait until next week. So I spent this week on various pieces of administrivia, as well as reading up on what are called the B-statistic and F-statistic (for Bayesian and Frequentist, respectively) which we will need to try and adapt to search for binary systems with significant precession. If you ever want to see otherwise mild-mannered statisticians fight, get a Bayesian and a Frequentist in the same room and started on which approach to statistics is better.

In non-work news, I am in the same apartment as last summer (which Andrew will remember) though they have remodeled the kitchen and it now has an oven and slightly larger (though still small by American standards) fridge. Not sure that improvement was worth the 30% increase in rent, though the internet has seemed intermittently faster; I even got the occasional youtube video to play. On Sunday I visited the church I always worship with again; they invited me on their canoe trip this year but it will be after I leave for the summer so I cannot go. Perhaps I will stay drier, though.

Tchuss,

Josh

From Dr. Rusty Towell:

Hello Dango,

The BNL crew worked every day of the holiday weekend and finished taking shift for PHENIX on Tuesday. Then bright and early on Wednesday we took the traditional group picture in front of the BNL sign with Dr. Daugherity before he headed off to the airport and back to Abilene. The rest of us spent the day considering tasks to keep Ryan, Ramsey, Andrew, and Marshall busy for the next week while I'm gone. We met with Francesca, Daniel, Mickey, and Martin to talk about RPC analysis tasks and factory work. Since the RPC construction is finished and they are still working extremely well, there won't be much RPC hardware work this summer. However, we may help Mickey with some other prototype work such as modifying the cosmic test stand to better suit his needs.

Next we toured the PHENIX silicon detector lab. We learned why the $14 million dollar VTX detector isn't working and what steps PHENIX is taking to fix it. We offered to help, but they need students that could work on the project until it is reinstalled in PHENIX in December. So it doesn't look like we will help with it.

In the afternoon we met with Daniel so he could help us get started working on the BNL computing cluster and show us bits of old code that may be helpful. Our first analysis tasks will largely center on simple but important tasks needed to complete RPC and Trigger efficiency

studies. We ended the day in the RPC factory where we looked into what we could do to help with the cosmic stand modifications.

I ended my week by attending the Thorium Energy Alliance Conference. While I'm sure you are all familiar with the benefits of using nuclear energy to generate electricity, you might not be as familiar with the advantages of using Thorium instead of Uranium. Thorium has many advantages especially if you use a Molten Salt Reactor (MSR) instead of a Pressurized Water Reactor (PWR). Some of the many advantages are: 1000's of time more fuel, less waste, safer, operates at atmospheric pressure, ... One thing I haven't learned yet is why DOE is so unwilling to invest in developing these reactors now since they built the first one in the 60's and the advantages are obvious. The answer I'm sure is politics (and money), but it doesn't make sense to me and I don't have to like it. Anyhow, hopefully it will happen soon with or without DOE support.

Grace and Peace,

Rusty

#2: "Andrew doing Programming" –Marshall Towell

Picture of the Week Candidates

#1: "The summer 2013 PHENIX division of the ACU Nuclear Research Group in the PHENIX counting house with the single-event display in the background." –Dr. Rusty Towell

#3: "We found Ghost Rider" –Ryan Pinson

#**4:** "These web attacks can be painful!"
–Dr. Donald Isenhower

Other News

New Faculty

Dr. Matt Steele arrived in Abilene on May 25. He will join the Engineering and Physics faculty in the fall. Be sure to give him a warm welcome!

The Particle Data Group Announces:

The 2012 edition of the Review of Particle Physics is now available on the Web: http://pdg.lbl.gov/

- Summary Tables
- Particle Listings
- pdgLive
- Review articles

The PDG recommends our website for the public: ParticleAdventure.org

We thank the 700 members of the particle physics community who contribute to the Review of Particle Physics.

We always welcome your suggestions for improvements.