

Our Journey through the APS March meeting

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One of the biggest physics meetings ever, the APS March Meeting started on Monday, March 16, 2009 in Pittsburgh, PA. A recorded 7,000 physicists were in attendance. The David L. Lawrence Convention Center was in the center of Pittsburgh, with its doors open to all who registered. We didn't expect to find such a beautiful city waiting for us.

Monday, March 16

On Monday, our group decided to check out some of the talks. The first one we selected took place at 9:00 am, *Complete Quantum control of a single quantum dot spin using ultraviolet optical pulses*. It was quite interesting to learn the methods used to study these principles. Said Luan To, "This research helps to explain the ability to completely control the state of a single qubit. More importantly, it allows us to understand the optical single-spin control."

Afterwards, at 10:00 am, our group decided to hear a talk, *Effects of nanoparticles on chain dynamics and glass transition in athermal polymer nanocomposites (PNCs)*. The talk was about some of the challenges that scientists face when using polymer nanocomposites. One of those challenges is how to tailor the properties of the materials for applications. Tony Maldonado said, “Some of these applications are quite useful in determining the effects of PNCs, and how to understand the changes in their relaxation dynamics, and viscosity. Some of these challenges are difficult to overcome, but by using different technologies one can try to manipulate several conditions to better understand PNCs.”

One of the best things about this meeting was that it was open to everyone. Those who registered could explore anything of interest, and go to sessions and listen to talks on topics they found interesting. We all disagreed with each other multiple times on which talk we should go to next. At times, we attended different talks and met up later during the meeting. At 12:00 noon, our group went to the rooftop of the convention center and took pictures. It was one of the best moments of the trip, standing there and looking over Pittsburgh. Words can’t describe the way we all felt. Truly remarkable!

Afterwards, we attended the Undergraduate Research II Session. We were all happy to see SPS students presenting their research. All of the talks were very informative. Those who presented did a great job and represented the society in the best way. Ronald Maldonado said, “I felt quite comfortable listening to the research, and most of the things mentioned were well explained and understood; it was great to be a part of that experience.” Although we couldn’t stay for the whole session, we were all glad to have been there to witness this part of the meeting. Without it, we wouldn’t have met the other students and learned about their research experiences.

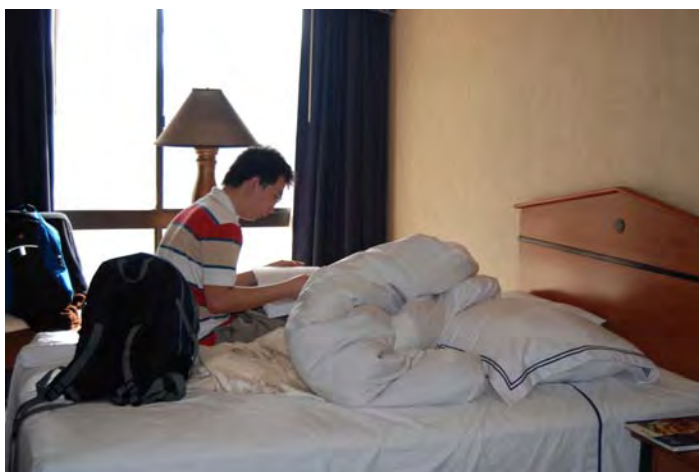
Another talk we all attended took place at 4:30 pm, *Indirect optical injection of carriers and spin in silicon*. We learned about degenerating a two-photon indirect absorption in silicon. David Jacome said, “It was great to learn the difference between phonon dispersion and polarization, and the steps taken to calculate the spin injection.” The room was packed with people who wanted to hear the talk, and afterwards many asked questions about the research. We all felt like we had picked the right place to be during this time.

Once this session concluded, we attended the Awards Session. David Jacome’s past advisor received an award for his research. David said, “It was just overwhelming to be in the room with the person who helped me tremendously in my career, and see him being rewarded for all of his hard work over the years. At that moment I was proud to be a physicist.” Dr. Yves Chabal, who was Director of the Laboratory of Surface Modification at Rutgers University, received the Davison-Germer Prize. David Jacome also said, “I remember attending the university and meeting him for the first time; he was just starting to form his research group. At the time, I was a part of that group, and today that hasn’t changed.” We all celebrated with Dr. Chabal.



After the Awards Session, we attended the Welcome Reception. There we met several students from New Jersey and talked about the meeting. Many couldn't believe that it was just the first day of the meeting. Samik Adhikari said, "I was amazed at the amount of people who came to the welcome reception, and how they socialized with everyone. It was a friendly environment that was full of conversions about the research that was presented on Monday." During the reception, cheese patties, small hot-dogs bites, roast-beef and chicken sandwiches were served. Also, there were ice-cream and chocolate bars for desert.

Our evening was great. After some exploring, we took the path train, took a climb-car to see all of Pittsburgh, and visited some local landmarks. During these moments, we met other physicists from the meeting and had some interesting conversions about the research that they do in other countries. Monday ended at our hotel, the Radisson Hotel Pittsburgh Green Tree.



Tuesday, March 17

Tuesday started off with all of us getting up at 6:30 am. We couldn't believe that the meeting wasn't over, but simply on its second day. The first talk we attended took place at 9:00 am, *Optimized vacuum thermionic energy conversion using diamond materials*. Joshua Smith was explaining the vacuum thermionic energy conversion device (TEC) and how it's an attractive alternative to other means of energy production. However, there are some challenges; for example, it's difficult to develop as a result of the negative space charge effect. To many of our members, this talk helped illustrate how increasing efficiency (electronic and blackbody heat transport) is very significant. We asked him a lot of questions, and learned lots from his research.

Then we split up so that we could listen to various talks of interest. At 10:00 am, some of us joined the discussion taking place during the talk *Nonlinear optical properties of carbon nanotubes from first principles*. In this talk, some scientists argued that for all chiral nanotubes, both the real and imaginary parts of $\chi_{xyz}^{(2)}(-2\omega, \omega, \omega)$ show an oscillatory behavior, but the chiral nanotubes have potential applications in nonlinear optics that change the static value of both $\chi_{xyz}^{(2)}$ and $\chi_{yzx}^{(2)}$ to zero. Being present during this talk was overwhelming because of the discussion it started, and the significance of this research overall.

Other members of our group attended, *Exploring possible magnet properties of ordered manganese monolayer on wurtzite GaN*. Many of us had never heard of such research and thought that perhaps this was the right time to learn something about it. The research explained the investigation of magnetic material systems using techniques with high magnetic resolution. Some of the explanations given were familiar, covered in an Electricity and Magnetism course or mentioned in a Quantum Mechanics course. For example, they explained how spin-polarized scanning tunneling microscopy can be used to show when a powerful magnetic structure is formed at an atomic scale. Also, it was explained that initial results with a new system are expected within the very near future. We really took an interest in this talk. Afterwards, many of us debated and argued about what was calculated. Finally, we all agreed to take a break and visit the Exhibit Hall and talk with a few companies about possible internship opportunities.

Many companies took interest in us, giving us business cards and agreeing to send information by mail. The meeting was a great way to look at what many companies offer to students. Ronald Maldonado said about one company, "They gave us demos on Origin 6, which is used for 3-D graphing, and is good to use for spectroscopy data plotting." Also, we were invited by Kurt J. Lesker to a reception because we purchase many of our vacuum parts from them. It was a great opportunity to meet those representing the companies that are frequently called upon for special order parts. David Jacome said, "Seeing all the companies in one place was great, students got the chance to interact with those involved in the manufacturing process, and to ask for an updated catalogue from them. Also, if future help is needed, having business cards from those at the meeting will make a huge difference. You never know when you will need to contact them; it truly pays off in a big way to know someone."

Around 3:00 pm, we all attended a talk, *Understanding and controlling photovoltaic effects in complex oxide thin films*. The talk was about the electrical and quantum efficiency measurements that explain how the photovoltaic effect works. A photovoltaic effect comes from a Schottky

barrier between ITO and p-type BFO, with the time-dependent or capacitance-voltage measurements showing the ferroelectricity, ion motion, or trap. These parameters turn out to play an important role in the electrostatics of the device mentioned during the talk.

Once the talk ended, we decided to take a short break and discuss the research seen so far and get ideas of what to see next. After an hour of planning, and interaction with scientists that we met at a luncheon roundtable on the second floor, we all headed to a talk, *Qubit decoherence due to a Josephson bifurcation amplifier trapped in one of...* Luan To said, “Wow, I wasn’t aware that you can observe a qualitatively different behavior for two different attractors while interpreting the result as the combined effect of the amplitude of the detector’s response to external driving.” Luan believed similar results could be achieved differently, but agreed that this way was much more clear and easy to understand. Afterwards, it was time to do some exploring around the city again. Here are some pictures of what we saw:



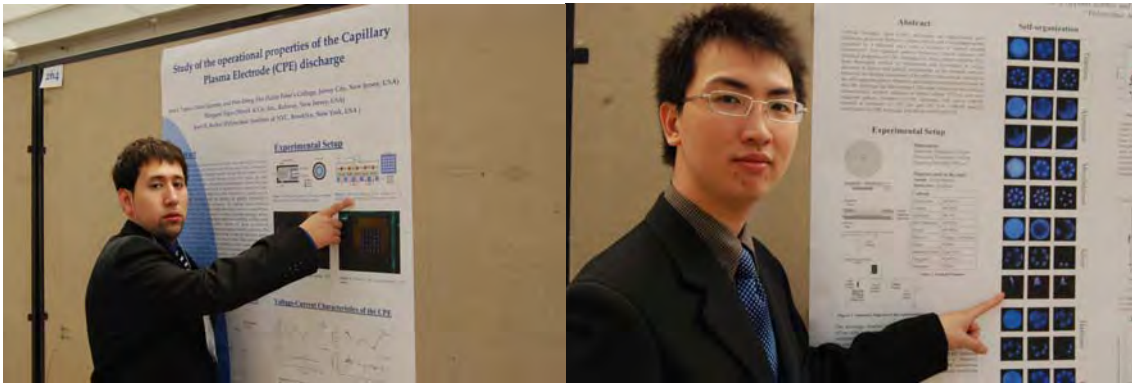


At 7:30 pm, we took the shuttle back to the hotel. Tuesday was very exciting for all of us, and in the end we were all tired. We ate dinner and went to sleep.

Wednesday, March 18

When we all woke up on Wednesday, we noticed it was foggy outside. It was the day for poster presentations. We all took the shuttle at 10:00 am and had breakfast in the exhibit hall with some friends and colleagues. Afterwards, it was time to put up our posters and put a smile on our faces. David Jacome said, “The wait time was worth all the hard work we put into getting to this meeting. Now we get the chance to present our research to a huge audience of physicists, amazing!”

The poster session started at 12:00 pm. There were many students interested in our research. Here are pictures of us explaining the important parts of our poster:



Some pictures with members of our group near the poster:



We spent 3 hours presenting our posters. Many students complemented our research and shared common interests. Here is a picture of a student from Mexico City who enjoyed our poster:

Apart from all the great posters that were seen and presented, we also took special interest in some of the research from different countries being presented at this meeting.



It was great to see so many faces at this meeting, and the passion that many students share for physics research and outreach. At this meeting, we established good relationships with students from California, Ohio, Mexico, Texas, Florida, Pennsylvania, New Jersey, Switzerland, Germany, and other parts of the world. Each student gave us contact information to use for future collaborations, and tours of their faculties.

We all appreciate this great opportunity given to us by the Department of Applied Science of Technology (Physics Division) at Saint Peter's College. In particular, our SPS advisors Dr. Jose Lopez and Dr. Wei-Dong Zhu gave us all great advice and pushed us to attend this great APS meeting. Also, we would like to thank Dr. Gary White and the Society of Physics Students National Office for all the help and support they give to students. Without them, none of these opportunities would be available. We all love the Society of Physics Students and will continue to represent them in the best way. Together, we can all make a difference to promote physics worldwide.