

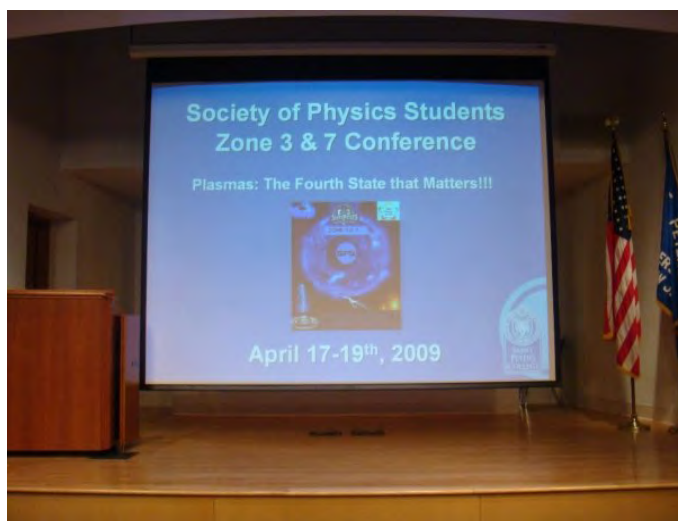
## **SPS Zone 3 & 7 Meeting in Jersey City, NJ Saint Peter's College**

**Reporters:** David Jacome, Ronald Maldonado, Tony Maldonado, Jonathan Ocasio, & Kapil Bastola

**Advisors:** Dr. Jose Lopez, Dr. WeiDong Zhu, Dr. Leonard Sciorra

**IT WAS THE MEETING OF THE YEAR!  
THIS YEAR'S ZONE 3 & 7 MEETING TOOK PLACE AT SAINT PETER'S COLLEGE  
ON APRIL 17<sup>th</sup> - 19<sup>th</sup>, 2009**

**OUR THEME WAS:  
Plasmas: The Fourth State that Matters!!!**



## Friday, April 17<sup>th</sup>, 2009

Registration took place inside McIntyre Lounge. Kapil Bastola (Vice President of the SPS Administration) and Jonathan Ocasio (Vice President of SPS Activities) are credited for helping organize all the IDs, and distributing them to the students who arrived. Tony Maldonado (Secretary of SPS) was there to personally greet all those who arrived. Here is a picture of him posing for the camera:



We kicked off the meeting with a Sigma Pi Sigma Induction Ceremony. Dr. James Grant started the ceremony talking about his years at St. Peter's College, and the moments he remembers with students who graduated in physics. He said, "It was a long time since I taught physics, but I do remember the hard times my students had in class, but we all enjoyed doing physics, it was a part of each of us, something that we loved exploring, and today I miss teaching it". Through his long and distinguished career at St. Peter's College, he served as an Academic Dean and Vice President of Academic Affairs. In 2000, Dr. Grant retired and now holds the title of Professor Emeritus of Physics. Below, to the right is Dr. James Grant, Dr. Michels wife, and Dr. D.J. Michels.



Those inducted into the 40<sup>th</sup> year of Sigma Pi Sigma include Dr. D.J. Michels (physics alumnus), Dr. Bob Barker, David Jacome (President of the St. Peter's College SPS chapter), Quincy Iheme, Brian McCullough, and Luan To. Each of the students inducted were given 5 minutes to give thanks to those who have helped them accomplish this honor. David Jacome said, "I would like to thank my grandparents for coming, my mother who's in Ecuador, friends/colleagues & my professors for pushing me to work hard in physics, I've learned that in life you have to do what you feel most passionate about, and I'm glad that I now belong to this society. Below is a picture of David during the Induction:



Quincy Iheme also thanked his parents, professors, girlfriend, and friends for the honor. Brian McCullough, who is the 5<sup>th</sup> generation McCullough at the college, spoke about the legacy to finish and never give up wanting to be a physicist". Luan To said, "I'm very happy to be receiving this honor, it's a great chapter to be a part of, also giving thanks to his family, friends, and professors for helping him in his career".



During the ceremony, Dr. Jose Lopez (Assistant Professor of Physics, St. Peter's College) talked some more about the 40 years of Sigma Pi Sigma at St. Peter's College. He mentioned that all the alumni and Sigma Pi Sigma members have become professionals and hold leadership positions today. Afterwards, it was dinner which started at 6:00 pm. Dinner was Cuban Steak, with rice, potatoes, Romaine Salad w/ French Dressing & Small Breads on the side. Desert was Chocolate cake, Cookies, Small Fudge pieces, & brownies. It was lots of fun to talk with other students during this time and take pictures. During this time, we meet the students from Stevens Institute of Technology, Millersville University, & Juniata College. They were all excited about the meeting. Below are some pictures we took:





Concluding Dinner, Dr. D.J. Michels gave his honorary talk entitled, “The Magnetic Nature of the Sun and the Description of How Magnetic Fields Control and Modulate the Release of Solar Plasma into the Heliosphere, often with Explosive Force”. Everyone was amazed about the research that Dr. Michels has done. His talk pointed out that empty space is not really what it means, it’s filled with an energetic stew of particles and fields emanating from our star. Many students could relate the important of the Sun, and how we are trying to understand it more and more each day. Dr. Michels said, “Robotic space missions have allowed us to measure, map, and even image with unprecedented resolution the dynamical behavior of the plasmas comprising the medium, these interactions between the Sun and Earth have assumed such importance as to be called ‘space weather’, which is now being monitored carefully”. Ronald Maldonado said, “Plasma Physics is an important field to grasp, because there is still many things are not well understood, but as scientists we are using models to determine what is expected to happen, and look carefully at the diagnostics to make sure it’s right”. David Jacome said, “Technology is getting better, and computing is now easier than before, it’s incredible how devices can measure the temperature of hot plasmas, or we can do a simulation to better understand the effects over time, this is great”. Many students asked Dr. Michels many questions. One that we all discussed together was, “How does the Sun’s magnetic nature affect the outcome of the most violent outbursts and what effect does it have on Earth?” There were a couple of answers to this question. One way is to try and study the effects over time with the nearby satellites we have, on Earth we can see the Northern

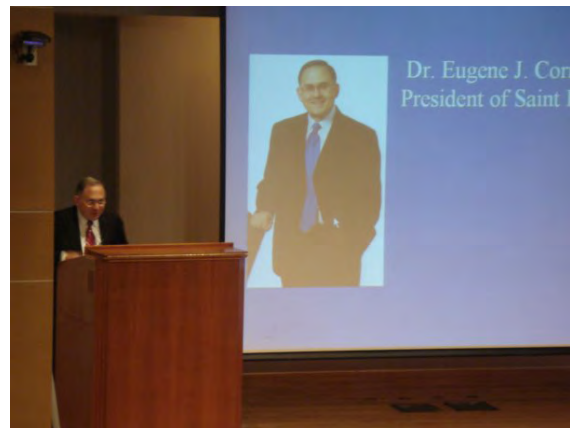
Lights, and we become curious to understand why it's happening. It's something that many scientists are working on trying to understand better, and to create advanced technology that can send back information without damaging these devices due to the high temperatures of the Sun. Here are some more pictures:





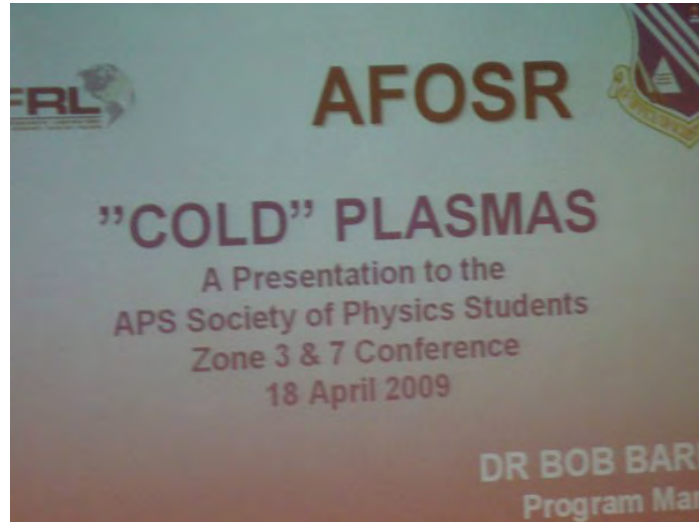
Friday ended on a full stomach.

### **Saturday, April 18<sup>th</sup>, 2009**



The morning talks took place in Pope Lecture Hall. Breakfast was served outside the lecture room. For Breakfast, it was the famous Dunkin Donuts w/ coffee, orange juice, apple juice, or milk. Dr. Cornacchia (St. Peter's College President) talked about St. Peter's College at 8:00 – 8:50 am. He talked about the history of Jersey City, NJ and how it's the most diverse place in the United States. Also, he talked about the importance of St. Peter's and how the college was founded in the late 1800s. Everyone was shocked to hear that the world's tallest analog clock (The Colgate Clock) was actually first built in

Jersey City, the title was held for a long time. It was also the birthplace of many of the Colgate Factories. The streets of downtown Jersey City a long times back would smell like the toothpaste. It was now time for the Plasma Physics Keynote Series.



The first talk was entitled, “Cold Plasmas” given by Dr. Robert J. Barker. The workshop offers a unique venue to compare and contrast “fusion branch” of the plasma research community and its non-fusion counterparts. Dr. Barker is the Air Force Office of Scientific Research’s program manager for plasma physics in the Directorate of Physics and Electronics. He is an internationally recognized expert in the fields of plasma physics, microwave generation, and computational physics. His talk strongly focused on, “Some bio-effects of pulsed power plasmas, high power microwaves (HPM) sources, vacuum electronics, air plasma physics, compact pulsed power, and computational plasma physics. David Jacome said, “It’s great to hear an expert like Dr. Barker outline the importance of these fields, and how much research is going on to study the properties of plasmas”. Tony Maldonado said, "We are now in the era where science is very important, and key for survival, we need to try and work together to understand these basic functions to advance research opportunities at all levels”. Ronald agreed with Tony, and replied “President Obama is working with everyone to advance science, and fund more projects that help students be more involved in basic research”. David says, “It seems that our focus is to teach others the importance of Plasma Physics, and the talk

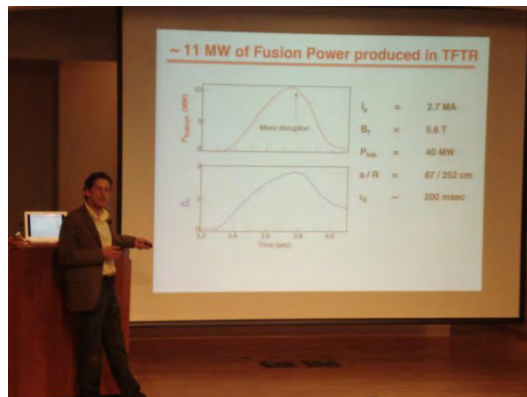
helped to illustrate the areas that need more attention and require more students to be actively involved in”. Below is a picture of Dr. Barker:



St. Peter’s College received a \$2 million grant to start a center that focuses on teaching others the importance of Microplasmas – The Center for MircoPlasma Science & Technology or CMST. It will act as the headquarters for MicroPlasma Research in the United States, working in collaboration with Princeton Plasma Physics Laboratory, Polytechnic Institute, Stevens Institute of Technology, New York University, The Plasma Science and Fusion Center at Massachusetts Institute of Technology and a few other institutions.

Talking about Princeton Plasma Physics Laboratory, the next talk was entitled, “Creating a Star of Earth – the promise of Fusion Energy, given by Dr. Andrew Zwicker. Dr. Zwicker is a recognized plasma physicist and the Head of the Science Program at the PPPL. His current research interests are in dusty plasmas, plasma processing, and plasma education. His talk was on creating a fusion energy reactor. He mentioned, “As you all know, the closest working fusion energy reactor is more than 93 million miles away. David commented, “It’s great to learn about the research at PPPL which is about 100 miles from St. Peter’s College, where they are trying to understand how to heat and confine plasma at thermonuclear temperatures”. Dr. Zwicker said, “One goal is to try and turn the output energy into an economically viable source of electricity”. Many students

enjoyed this talk, because it described how science is so vast, and even though we build a device, it's not certain whether fusion is created. There is much speculation, but we are still 50 years in delay of having fusion on Earth. The next big project is ITER, and there are still some challenges that scientists face. Plasma Physicists are praying that it will work and their models are correct. This is a very exciting time for those working on the project. Dr. Zwicker says, "Over the years, there has been improvement in diagnostics work, but it's still not clear whether we will achieve fusion in the next 100 years". This is one of the biggest challenges in science today.



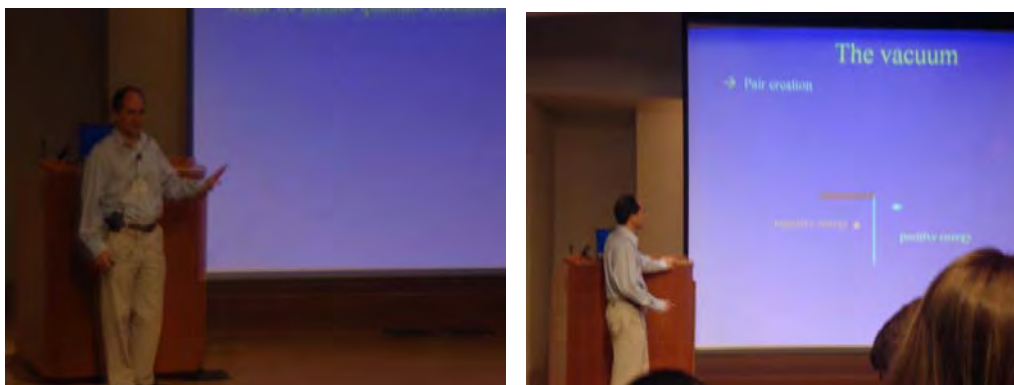
It was time to mention some of the research done at St. Peter's College. Dr. Weidong Zhu (Assistant Professor of Physics at SPC) talked about some of projects at the college. Like mentioned previously, the main focus at SPC is MicroPlasma Research. Dr. Zhu said, "When operated at elevated pressures up to atmospheric pressures, discharges tend to transmit into arcs". At SPC, we try to look for different way to keep the plasma confined, like MHCD (MicroHollow Cathode discharge), CPED (Capillary Plasma Electrode Discharge), or DBD (Dielectric Barrier Discharge). David Jacome is the Project Leader on the CPED experiment. He commented, "A Capillary Plasma Discharge is very important to understand because of the unique modes one encounters, like corona, jet, or streamer, a plasma is best in jet modes – our main focus is therefore to understand the Physical behavior of the plasma under the conditions for jet mode". A capillary plasma electrode is a device that produces atmospheric pressure non-equilibrium plasmas. With a CPE device, the jet mode is much easily achieved. Ronald said, "The research done at St. Peter's College is significant, and has helped companies worldwide. For example, one of the projects I've worked on with Dr. Frelich (Visiting Research Professor of Physics) has helped the company ozonia build better ozone generators for purification of water. That's very cool." Luan To mentioned, "There are so many applications in plasma physics, and it's a very interesting field with many unknowns."

After Dr. Zhu's talk, everyone had lunch. For lunch, Subway Sandwiches were served. We had: Roast Beef, BLT Subs, Tuna Subs, Vegetable Club, Turkey – Ham – Salami, & Italian Club. Everyone was introducing there SPS group. From across the room, you could also hear all the discussions about Plasmas, it was fun to be there. Below are pictures taken during the Lunch Period:





Lunch was from 12:00 – 1:00 pm. Following lunch was the Physics Special Topics Series. The first presenter was Dr. Juan Maldacena (Professor of Astrophysics at the Institute for Advanced Studies & Princeton University). Dr. Maldacena is one of most famous theoretical physicists in the world. Among his many discoveries, the most famous one is the most reliable realization of the holographic principle- namely the AdS/CFT correspondence, the successfully tested conjecture about the equivalence of quantum gravity in negatively charged spacetimes, and a conformal field theory defined on its boundary. His talk was entitled, “Black Holes and the Structure of Space Time”. Dr. Maldacena says, “Black holes are fascinating objects predicted by general relativity, black holes had an interesting story.” Throughout the talk, students were puzzled about the explanation of black holes, and how it’s understood. Many physicists, including Einstein felt that black holes were freak solutions of the equations that would never arise in a real physical system. Ronald said, “Studying Black holes is quite of complex, because the objects are distorted in space and time making it hard to picture the effects”. There were a lot of questions directed to Dr. Maldacena about what is understood, and what can’t be proved experimentally. He said, “We are about to run simulations about what is believed to happen using theory, but it’s not for sure that the outcome is the way we see it”. It was great to hear something different from our plasmas series of talks. It certainly left the crowd looking at the big picture. We are still trying to learn new ways to understand the perspective on the nature of space and time.



One of the last talks for the afternoon took place. It was entitled, “The Astronomical Evidence for Black Holes in the Center of Galaxies”, given by Dr. Scott Tremaine. Dr. Tremaine is widely regarded as one of the world’s leading astrophysicists for his contributions to the theory of solar system and galactic dynamics. Tremaine is the namesake of asteroid 3806 Tremaine. He is credited with coining the name “Kuiper belt”. His talk was on reviewing the growing astronomical evidence that massive black holes are found at the centers of many galaxies, including our own Milky Way. Dr. Tremaine says, “These black holes we so carefully study are the ashes of the fuel that powered quasars early in the life of the universe”. Tony commented, “It’s amazing to learn so much from Dr. Tremaine and his research, we focus our attention to the evolving universe and how different it has become over the years”. Kapil mentions, “Understanding the prospects of the black holes, we can use them to learn the predictions of Einstein’s theory of general relativity, and it allows for a deeper picture of what is happening”. Dr. Tremaine also says, “We are at the point in time, where proof is needed and no one is going to make an assumption without having sufficient knowledge on what the outcome will be or how do we get the results in such cases”.

Both Drs. Maldacena and Tremaine explained the Theory behind Black holes. We were able to recognize the importance of such studies and distinguish the goals that one wants to accomplish. We believe that everyone liked these talks, and it provided many answers to questions students might have wanted to know about. Finally, it’s time for the Physics Jeopardy Game.

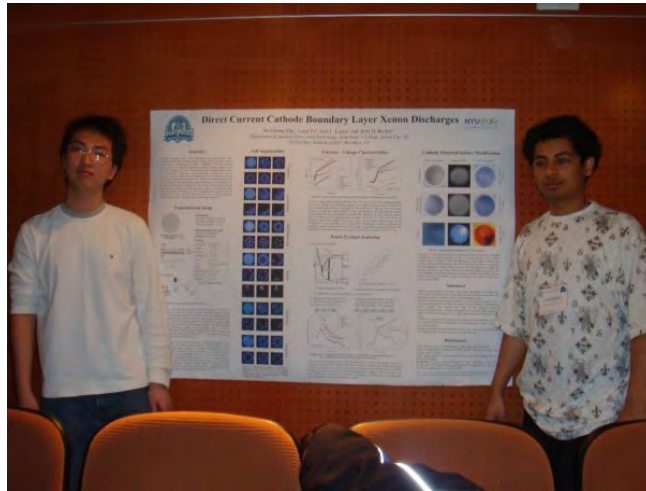


Many schools participated in the game. Dr. Jose Lopez was the host of Physics Jeopardy, David Jacome was the scorekeeper, and Dr. WeiDong Zhu was the announcer. It was a tough and serious game, by only one group could come on top. Millersville University won the Physics Jeopardy Game. They are the Zone 3 Champions of Jeopardy!! Colleen Schmidt won a Signed Copy of Dr. Barker's Plasma Book.

Below are some pictures taken:



Afterwards, it was time for the SPS raffle of Textbooks. Did you save your raffle ticket or leave the meeting? Well, a few raffles were called, and no one answered. The raffles included: A Physicist's Guide to Mathematica book, An Electricity & Magnetism textbook, and Part II of Einstein's Philosophical Thoughts. There was a poster session that followed the raffle. Here is a picture of Luan To standing by his poster with Ronald Maldonado:



Saturday ended with a Dinner and an excellent talk. Dinner was fantastic, Pasta Chicken w/ sauce, bread, lasagna w/ cheese, sliced chicken strips w/ dipping sauce, & a mixed salad w/ crotons. Desert was chocolate chip cookies, walnut cookies, banana cake, fudge cake, and brownies. Here are pictures taken during the Dinner on Saturday:





The meeting ends with a presentation from Dr. William Gutsch entitled, “Our Evolving Universe of the Mind”. Dr. Gutsch served as Chairman of the American Museum-Hayden Planetarium in New York, NY and Science Correspondent for ABC’s *Good Morning America* and *World News This Morning*. He also has written, produced, and/or appeared in programs for PBS, NBC, CNN, The Learning Channel, and NASA-TV and was nominated for an Emmy in 1986. Dr. Gutsch has written for and directed numerous Hollywood legends including Gregory Peck, Burt Lancaster, Kirk Douglas, Rita Moreno,

and Charlton Heston as well as many of the Star Trek cast members. This is just a brief summary of Dr. Gutsch's career. You can choose to read the entire bio from the conference booklet. During the talk, Dr. Gutsch said, "There are many questions and challenges that remain for the next generation of physicists to tackle, especially in astrophysics". David noted, "It's important that we learn from the wise like Dr. Gutsch, and face the challenges to educate the future students in science. This way, they have more of an appreciation for studying these phenomena's that us scientists research about. It's taking the extra step, and making sure that science remains in good hands 50 years from today." Here is a picture of Dr. William Gutsch to the left, followed by Dr. Jose Lopez & Dr. WeiDong Zhu:



Students were amazed about Dr. Gutsch's career highlights. He mentioned to everyone his experience working with the Star Trek Crew, production companies like Paramount, Lucasfilm Ltd, and The Children's Television Workshop. Not only did he mention his interests and research, but he talked about serving as President & CEO of the Challenger Center for Space Science Education. The center serves 400,000 students and teachers annually through a network of over 50 Learning Center on three continents. Recently, Dr. Gutsch was appointed as Distinguished Full Professor of Arts & Sciences at Saint Peter's College. Our group eating dinner:



Dr. Gutsch ended his presentation saying one thing, “Nothing is impossible, all you have to do is motivate yourself to never give up trying, and keep a positive thumb up everyone you go in life”.



David ended the meeting with final words, “In life, you always experience a vision, something that at first seems impossible to accomplish. You work extremely hard to show others that vision and hope the message gets across. These weeks I’ve shared that vision with each and every one of you who came. My vision to inspire others to do physics and share important discussions about the world. It’s not who we are that makes us special, it’s who we share those moments with that makes it worthwhile. Thanks for coming to this Zone 3 & 7 Meeting.”