



MARQUETTE
UNIVERSITY

The Need for Science Outreach in the Community

2012 Quadrennial Physics Congress of Sigma Pi Sigma

Orlando, FL November 8 – 10, 2012

By the Marquette University SPS chapter

Due to the small size of Marquette University's physics department, we are a fairly close group. Sharing a common workspace stimulates cooperation and student involvement. This year, as we were struggling to pull together enough funding to attend the Quadrennial Physics Congress of Sigma Pi Sigma, we entered the *Radiations* magazine crossword drawing. After working together on some of the tougher clues and with a stroke of luck, we won a \$1000 physics crossword challenge offered by Dr. Diane Jacobs, a past president of Sigma Pi Sigma, to

support chapter attendance at PhysCon. With her contribution and an SPS Chapter Reporter Award, we were able to pull together the rest of the funding required to send six students to the meeting.

Throughout the Congress, it became increasingly obvious that SPS has an extremely cohesive, encouraging, and helpful group of leaders, members, and volunteers. For example, during a workshop activity we were given a scenario in which each group had to decide how to implement cuts to the federal science budget. Despite the groups being composed of a variety of ages and backgrounds, many of the groups were able to reasonably discuss and come to some kind of an agreement on which cuts would be the most logical. Volunteer "Workshop Wizards" aided the few groups that struggled to come to a conclusion, and in the end believed that given more time the groups would have arrived at a consensus. Looking at society as a whole, and especially considering governmental bodies, this level of collaboration and compromise is atypical, yet throughout the conference this was commonplace. With the positive meshing of the attendees' scientific backgrounds and the cordial attitude of the conference, this made for a pleasant experience.

During the Congress, we appreciated how much effort SPS put into making participation in the Congress both enjoyable and helpful. Each of the scientists that participated was exceptionally



Marquette students with Dr. Jocelyn Bell Burnell after her plenary talk "Reflections on the Predicted End of the World in December 2012."
(L-R) Mike Nichols, Abigail Searfoss, Dr. Bell Burnell, Kyle Kimminau, and Justin Provance.

involved and made it a priority to provide the students with useful and relatable information. During "Breakfast with the Scientists," the undergraduate and graduate students ate at tables hosted by professional scientists, which opened us up to many career paths we had not considered. For example, as a result of this breakfast one of our members is now looking





Kyle Kimminau and Wei Wu with the whole universe in their hands at Kennedy Space Center.

into the possibility of an internship at the Department of Intelligence.

Other volunteers led workshops to help us prepare for the workforce and engage in public outreach. A favorite workshop among our group was led by Henry Reich, creator of “MinutePhysics”, a series of YouTube videos that discusses physics topics. In one exercise, we were given the challenge to describe a pencil in five words. It reminded us that we do not fully understand a concept until we can explain it simply to someone else. After seeing the effort put toward bringing so many undergrads together and the positive outcomes from this, our chapter decided we need to be more active in outreach. In his workshop, Dr. Gary White provided insight into fun projects that are easy for SPS chapters to bring into schools in their local communities. In

particular, his suggested model for the warping of space time seemed to attract a large amount of interest, no doubt due to its use of spandex. Dr. White’s presentation and learning about the diversity of outreach programs at other schools has compelled our club at Marquette University to grow in this area of service. Furthermore, once these experiments and demonstrations are initially constructed, they can last for years, ensuring that the next wave of SPS students has the material and lesson plans to continue the outreach activities.

As a spectacular finish to the Congress, Dr. Jocelyn Bell Burnell discussed the most popular theories for the end of the world in her plenary talk, “Reflections on the Predicted End of the World in December 2012.” While she presented the myriad of 2012 scenarios, the room was often filled with laughter. Many of the theories violated the laws of physics so absurdly that it was hard to believe anyone could take them to be possible. For example, one theory was that the magnetic poles of Earth would switch, causing the planet to come to a complete stop and reverse its rotation about its axis. Dr. Bell Burnell’s initial response to this was: How do you even stop the Earth from spinning, without inventing a god or something like that? Another theory claimed that an alignment of the planets would cause a gravitational pull on the earth strong enough to rip the planet in half. In response, a student sarcastically remarked, “That’s totally how gravity works.” The audience was rather pleased with Dr. Bell Burnell’s analysis of current 2012 theories, however the unfortunate fact is that a large number of people actually believe these developments could happen. While quite amusing to a room full of physicists, it was also a clear and frightening statement about the lack of scientific understanding in our society.

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One point Dr. Bell Burnell made was that most of these ridiculous theories are actually grounded in some scientific fact. Clearly people are misconstruing scientific knowledge and arriving at impossible conclusions. Nonetheless, the point is that people are trying to use science to understand the world. Therefore, if all scientific programs put more effort into bettering the scientific education of the general public, people could better discern scientific truth from fiction, mitigating beliefs in such impossible theories. It is our duty as a scientific community to reach out and aid in providing a stronger foundation of public education.

Throughout the conference, one theme surfaced repeatedly in almost every lecture and workshop. Outreach



to the public is crucial for the mutual advancement of physics and the general populous. Education and outreach are means by which we can spread scientific interest and ensure that the field prospers in the years to come. An informed public is less likely to cut spending on a program when they can grasp the long-term effects that may arise from it. As Dr. Bell Burnell indicated, when scientific education is not encouraged in schools, we raise a population that is scientifically illiterate and cannot distinguish between reliable information and false premises presented under the guise of scientific fact. This in turn circles back around to hurt the scientific community, for when persons masquerading as true scientists make such outlandish claims others shy away from the field. The credibility of real science is hurt and the literacy of the public continues to drop.

Outreach is the obvious solution. If the physics community begins attracting students at a young age and can keep them interested, we will not only attract new faces but also begin a trend that can spread through more outreach, education, and the students themselves. Even as we attempt to unravel the universe, it is evident that we have a long way to go, and to ensure that our goals do not die with us is to bring in a new wave of minds, curious and interested in the same phenomena that intrigue us. Therefore, we must step out of our offices and laboratories in order to share our work and scientific interests with not only our peers in the field but with the general populous.