chicago 2009 AAPT WINTER MEETING	AAPT winter meeting & AAAS annual meeting February 12-16, 2009 - Chicago, IL	AAAS

During February 12-16, 2009 I attended, for the first time ever, the 138th American Association of Physics Teachers (AAPT) winter meeting that was held in conjunction with the 175th American Association for the Advancement of Science (AAAS) annual meeting in Chicago, IL.

I wrote a short article in the previous issue (February 2009) of NJAAPT newsletter and I am following up in this month's newsletter with more details about what I experienced and learned. In my opinion, one of the shortcomings of this meeting was that many sessions were scheduled to take place at the same time in different rooms within The Fairmont and Hyatt Regency hotels. I had to pick and choose what sessions to attend; bouncing from one session to another that is taking place at the same time. Considering the travel time there was a good chance to miss the whole thing; the talks are relatively short (30 minutes for invited talk and 10 minutes for regular presentation). Therefore I evaded doing that.

Thursday, Feb 12

I signed up for the visit to Fermilab. It was an organized tour; we left the hotel in a school bus (!) early in the morning. Upon arriving, a scientist-host guided the whole group throughout the lab. You already know that reputation of Fermilab as one of USA's leading research laboratories. A very good visual analogy for dark matter was on display in the main building. It was a large glass jar filled with black jelly beans and scattered throughout the jar were colored jelly beans. Overall it was well worth-it, and I was happy to check the trip off my personal "to do" list.

Friday, Feb 13

The workshop I originally signed up for was cancelled, so I spent the whole day walking through the exhibits and visiting all the booths. I collected pencils, lanyards, bookmarks, pens, bags, flyers, and other miscellaneous objects. At one point I started worrying about the weight limit on my luggage and realized that I should be more selective in getting the goodies.

At the American Institute of Physics (AIP) booth I found playing cards with physicists' figures on it. Visit http://store.aip.org/shop.do?cID=3 if you would like to order a set. In case you are wondering, Einstein is not on the ace of spades.

Saturday, Feb 14

Early in the morning I went to the “First-time gathering” meeting-breakfast where the president of AAPT was present, Mrs. Lila Adair, and many others. They congratulated us for participating at the national meeting, and the homework given was to encourage all physics teachers to join AAPT and their local sections. In the goody bag we received was a PASCO t-shirt, a fancy pen, a Wiley shopping bag, a badge holder/wallet, and a $15 coupon to the AAPT book store.

After the breakfast meeting, I attended the session “Physics Education Research in High Schools”. The first talk was presented by Suzanne White Brahmia (Rutgers Univ.) and it was about *Physics Union Mathematics (PUM*), a new physics curriculum based on *Investigative Science Learning Environment (ISLE*), in which students engage in processes that physicists use to construct new knowledge. For details, visit http://pum.rutgers.edu/index.php and http://www.islephysics.net/

Then, Jeff Morgan from the University of Northern Iowa talked about the *Physics Resources and Instruction for Secondary Science Teachers (PRISST)* program, a two-year professional development for out-of-field high school physics teachers seeking physics teaching endorsements (of course, for the state of Iowa). The PRISST program provided the participants with professional development in physics content and pedagogy with focus on interactive engagement techniques utilizing *PRISMS (Physics Resources and Instructional Strategies to Motivate Students)* and *Modeling Instruction Program*. Visit http://www.prisms.uni.edu/ , http://modeling.asu.edu/ , and http://www.physics.uni.edu/outreach.shtml. Such programs are valuable to physics teachers in New Jersey too, especially for those that began teaching from other professions via alternate route.

An interesting talk was that of a professor from Seoul National University (South Korea) about students’ understanding and interpretation of diagrams found in the high school textbooks. The diagrams found in most textbooks reflect understandings and models of physicists and physics teachers rather than students’ understandings. Pictures, sketches, and diagrams are colorful, with many symbolic elements such as solid line, dashed line, bold line, arrows, color gradation and so on. What do students understand by looking at these pretty images? The end suggestion was that textbook authors should include a legend near an image to denote the meaning of the symbols used, similar to what a geographic map has.

Joseph Zawicki (SUNY Buffalo State College, NY) and other physics teachers were involved in a project that examined different questions from New York State Regents Physics exams. His talk surprisingly revealed that conceptual questions were among the most difficult; they are actually not easier than the numeric questions. If you want to browse through the New York State Regents Physics exams since 1997, use the following link http://www.nysedregents.org/testing/scire/regentphys.html. The exams, as well as the scoring key are posted as .pdf file.

From next presentation I learned about QuarkNet’s Particle Physics Masterclass, a national program where students come to a local area research institute and interact with particle physicists through lectures and informal discussions while working together to analyze real particle physics data. The Masterclass program is

actually international, run by the European Particle Physics Outreach Group (EPPOG). Check-out the links: http://www.physicsmasterclasses.org/ and http://www.quarknet.us/library/index.php/Masterclass_Library. You'll find a lot of good information that can be used with your students about particles.

Lastly, Stephen Kaback talked about an introductory physics curriculum for the general student population that was created at The Blake School in Minneapolis. The new physics curriculum was a hybrid between the *Modeling Method of High School Physics* (Hestnes & Modeling group at Arizona State University, http://modeling.asu.edu/) and *Tutorials in Introductory Physics* and *Physics by Inquiry* (McDermott & Physics Education Group at University of Washington, http://www.phys.washington.edu/groups/peg/).

After the session I went to the Two-Year College (TYC) cracker-barrel discussions. I brought up the topic of concurrent enrollment; I was interested in other professor's experience with it. Some of you might be familiar with the concept; it is when two-year community colleges develop protocols with high schools within the county, allowing high school students to take college courses while in their senior year. The courses can be taken during the day at the high school or in the evening at the college. It is an advantage for high school seniors to earn college credits while in high school. The idea is not that easy to set up and mutually find an agreement between the school's BOE and the community college. Most high schools require only three years of science to graduate, and physics, an elective course that's not required to graduate, traditionally is taught last. Once the seniors start receiving the acceptance letters from colleges, senioritis kicks in, and the interest diminishes. By being enrolled in the concurrent enrollment program the students are kept motivated until the end of the year. If you haven't thought of it, I think it is an idea worth looking into. If you want to consider it, start by approaching your science supervisor, director of guidance and principal.

After a short lunch break I went to see the poster session 1. I was impressed to see what and how teachers, students, and college professors are working on so many projects beyond the classroom.

I then attended the Physics 2000 workshop hosted by professor E.R. Huggins. *Physics2000.com* is a college-level introductory physics course developed at Dartmouth College that begins with special relativity and ends with quantum mechanics, in between covering the usual topics. It is an interesting approach. From his website http://www.Physics2000.com you can either order, or download (for free) the textbooks (algebra-based Physics2000, and calculus-based Physics Calculus2000), the MacScope II (an audio software oscilloscope that works on Mac and Windows using the computer's audio input), and the Charges2000 field and voltage plotting program.

Speaking of free physics textbooks, here are some other resources available on the internet (I am not endorsing them, just FYI …): http://www.motionmountain.net/download.html ; http://www.lightandmatter.com/books.html ; http://www.anselm.edu/internet/physics/cbphysics/index.html ; http://en.wikibooks.org/wiki/FHSST_Physics. In order to minimize expenditures, I think that many science supervisors (and teachers) might want to consider looking into it for possible adaptations.

After the workshop I attended Mr. Al Gore's talk. The conference room was packed. The organizers installed a projector and a large screen in a second conference room at the second level, this was also full. It was very inspirational and motivational at the same time. Mr. Gore used his oratorical abilities to urge the scientists and the teachers to get involved at different levels (classroom and/or communities) to accentuate the awareness about global warming. The pictures he presented from the North Pole and Antarctica were seen in "An Inconvenient Truth".

Late in the afternoon I attended a few more session-talks. The first one was presented by Maxine Willis (Dickinson College, PA). The *LivePhoto Physics Project* had created a collection of classroom-tested, inquiry-based video analysis exercises primarily used for introductory physics courses that promote active learning through analysis of real world phenomena; see http://livephoto.rit.edu/. These curricular materials can be used as demonstrations, in-class exercises, tutorials, laboratories, and homework. In the assignments, students gather data by pointing and clicking on an object as the event unfolds in a 20- to 30-frame movie. Using the data collected from these "live photo", students develop computer analysis skills in graphing and analytical mathematical modeling.

Prof. John Cise from Austin Community College, TX had collected in the past three years articles from *The New York Times* that had physics applications to enhance student's interest in physics. Short introductory remarks, questions, and hints were added to the original article that was edited in a single word page and uploaded to the website http://cisephysics.homestead.com/files/NYT.htm (free access).

In the next talk, Brett van de Sande (Arizona State University) presented the *Andes Physics Tutor*, an intelligent homework helper for physics that has been used in the classroom since 2000. More information can be found at http://www.andestutor.org/.

Later in the evening, the local Chicago chapter of AAPT hosted a physics demo show. They were all dressed like pirates, gesticulating, mimicing everything, and all they were saying was "Arrrr …"; fairly entertaining. The point was to let the physics demos "speak" for themselves and emphasize the "Wow!" factor with no words.

Sunday, Feb 15

In the morning I had my poster presentation and at 1:30 pm I attended the plenary session and discussions on "Early High School Physics: Building a Foundation for Understanding the Sciences" where the invited speaker was Leon Lederman, former director of Fermilab and Nobel Physics Prize winner.

One of the presenters was Gabriel de la Paz, high school physics teacher in Clayton, MO. He talked about "*A TIME for Physics First*" (Academy for Teachers Inquiry and Modeling Experiences for Physics First) program, an initiative funded by the Missouri Department of Elementary Secondary Education to introduce Physics First (PF) in Missouri Schools. A-TIME for Physics First is a partnership between universities and several Missouri school districts. Details can be found at http://www.physicsfirstmo.org/ . The program started

in 2006 by designing a new curriculum with elements from modeling and inquiry methods and use for professional development. After the three-week summer program, selected teachers implemented Physics First in their 9th grade classrooms, received in-class mentoring, conducted lesson-study in professional learning teams, mentored protégés, and attended follow-up sessions and conferences. The 60 teachers who attended the first summer program returned for two more summers. Physics First lessons and assessments learned during the summer program were used by the teachers. Their input was also used to revise the curriculum. The program is still in progress; pre-post data is expected to be published in 2010-11.

Another noteworthy presenter was Ron Khan, director of client services for East Bay Educational Collaborative. He talked about a very large scale pilot initiative that is currently taking place in Rhode Island with the support of National Science Foundation (NSF) and local political organizations (office of the governor, state representatives, commissioner of education, and local community councils). After an intensive summer institute with 35 physics teachers in 2006, over 3200 9^{th}-grader students in 6 high schools were enrolled in a "Foundation of Physics" course. At this time, Rhode Island has no data of its own to support the effectiveness of the program. The science academic results of these students at the NECAP (New England Common Assessment Program) science test will be trailed. They will be the first group of students to take this exam after having the physics-chemistry-biology sequence. Also, there is an independent evaluation of the program; the first one was completed in Nov 2007 by Hazel Associates of Syracuse, NY. More information can be found at http://www.ebecri.org/custom/PhysicsFirst.html and http://www.ristem.org/Home.mvc/About/12

It is important to mention that both programs (Missouri and Rhode Island), had independently chosen to use the 9th-grade physics curriculum materials developed by a company called CPO Science. The company was originally formed in Cambridge, MA by Tom Hsu, principal author and developer of Physics First materials.

Afterward, the next talk I listened to was presented by John Stewart from University of Arkansas-*PhysTEC*, and it was about a new digital library resource for teaching and evaluating introductory electricity and magnetism. The library contains more than 1000 conceptual problems and multiple-choice that were algorithmically constructed from a collection of popular introductory physics textbooks. There is no cost associated with using the resource, but prior registration is required. For more information visit http://www.uark.edu/depts/physinfo/phystec/concept.html

In the next presentation, Stephanie Magnleby (Brigham Young University, UT) claimed that comic strips can be effective pedagogical and classroom management teaching tools. A well-chosen comic strip can be used to introduce a concept, or to dispel common physical misconceptions. Comic strips can also be employed to address classroom management and discipline issues in non-threatening ways. Also, storylines about tardiness, cheating, apathy, procrastination, and cramming are all to be found in the comics. During crunch times, like midterms and finals, comic strips can show support and empathy or take the edge off of a tough exam. A collection of physics FoxTrot comics sorted by topic were presented and distributed with the written

permission of Bill Amend, the creator of FoxTrot. A web-comic of romance, sarcasm, math and languages written by an "invisible" physics major dude is http://www.xkcd.com/.

Physics Resources and Instructional Strategies to Motivate Students (PRISMS) is a high school physics curriculum that began in 1982 as a collection of activities related to real-life student experiences. The original PRISMS, which contained approximately 130 student activities accompanied by teacher notes, and over 2,000 questions in a computer test bank, was not designed to replace textbooks, but rather to provide resources ideas and instructional strategies. The project received more NSF funding and Lawrence Escalada of University of Northern Iowa talked about the new PRISM PLUS that employs an enhanced learning cycle pedagogy. A complete learning cycle is one that provides fully integrated experiences that enable students to develop not only their problem-solving and inquiry skills but also a deep, long-lasting understanding of physics concepts. The PRISM PLUS includes activities and exercises grouped in 44 learning cycles (Force and Motion-14, Work and Energy-8, Waves and Optics-12, Electricity, Magnetism, and Modern Physics-10) that are designed to develop conceptual understanding of the major physics ideas being introduced, engage students in scientific inquiry, and cultivate scientific reasoning and problem-solving skills. The materials can be ordered from Centre Pointe Learning at http://www.cplearning.com/index.html

After an exhausting day, at around 10 pm I hit the sack.

Monday, Feb 16

The last day of the meeting; I attended the session "Researching the use of clickers in physics". I recently purchased (with the money received from a grant) a classroom set of classroom response system, a.k.a. "clickers". My intention is to use them during the 4th marking period. I was interested in the methodology of using survey questions, along with teacher and student feedback from past practices. There were invited presenters from Wright State University – OH, The Ohio State University, and University of Colorado-Boulder. Clicker use had become more widespread among faculty as a means of engaging students. Although originally intended for large lecture classrooms, faculty and students have found benefits of clicker use in small classes. A very good gathering of resources about clickers can be found at http://www.cwsei.ubc.ca/resources/clickers.htm. Also here you can find different talks, presentations, articles, questions collections and many other links to additional websites dealing with clickers.

Eric Mazur of Harvard University, known for the development of *Peer Instruction* (PI) and his involvement in *Project Galileo* recently studied the effect of clickers on the implementation of PI. He found that the benefits result more from the pedagogy than from the clicker technology alone. Peer Instruction is an instructional strategy for engaging students during class using a structured questioning process. Results from a wide variety of institutions indicate that PI increases student mastery of conceptual reasoning and quantitative problem solving and decreases attrition rates.

That’s all folks. It was a worthwhile experience, and I hope to be able to attend many more such national meetings in the future. The whole program guide (with abstracts) can be downloaded as a .pdf file (108 pages) at http://aapt.org/Events/WM2009/programinfo.cfm

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