ISPP REMINDER

May 2009

Our next meeting...

...is at The Museum of Science and Industry
Tuesday, June 2, 6:30-8:30 P.M.

Scroll down for a map and directions. **Parking will be free**. Take a ticket when you drive in to the underground garage and bring it to the meeting for a voucher. The location is the same as last time - Take one set of escalators from the Great Hall (where entrance tickets are sold- free for ISPP) up to the ground level of the Museum. Go past the Food Court and bathrooms to the green stairwell and up half a flight. Ruth will have signs up.

Future Meetings

July 23-25 AAPT Summer Meeting, Ann Arbor ,MI **http://www.aapt.org/**

At our last meeting...

…at Northwestern University, we were welcomed by **Art Schmidt** with donuts, coffee, and a really nice phenomenon. It was a piece of equipment designed by Helmholtz, himself, and produced by Rudolph Koenig in Paris, circa 1890. It was a beautiful lacquered brass instrument with two cylinders mounted on the same axle and driven by compressed air. The cylinders had holes in them which allowed air to escape in pulses and create sounds. It is called a **Beating Siren**. By choosing which sets of holes Art was able to produce beats between the two sources of sound. Using a mechanism similar to organ stops, he uncovered 10 holes on one cylinder and 8 on the other, which gave a ratio of 5/4 - a major third musically. He was able to vary the phase of one relative to the other but few of us heard and change in the sound pattern. There was some discussion as to whether the intensity should vary vertically because the sources were stacked. He was able to produce beats between the signals and calculate frequencies with a watch and mechanical counter. What a lovely piece of history and technology.

Paul Dolan and others made announcements about the Museum meeting on June 2, 2009. The **John Rush Award** will be presented to someone who has shared ideas significantly at many of our meetings. Do you know what the award is? Come and find out.

Gordon Ramsey told us of the 5 day AP Physics workshop at Loyola beginning June 6, and of the Acoustics workshop at Rose-Hulman Institute in Terre Haute, Indiana, the same week. Check with Prof .Moloney there for info and possible funding.

Paul also announced that NEIU was sponsoring some science activities for the Chicago area and had some funding for undergrads who wished to teach science. Contact Paul at NEIU in the Physics Department. The National AAPT meets at Ann Arbor July 23-25. Workshops extend the length of the meeting. Some are free, sponsored by manufacturers, while others have a small charge to cover the cost of materials and the meeting room. The presenters are volunteers. Everyone should go to an AAPT summer meeting if your school can afford to help you. The meetings are a great way to meet people from all over the world. Martha Lietz at Niles West HS is our local connection to the meeting and Gordon Ramsey of Loyola University is very active, serving on the executive board. Either one can give you details or go to AAPT.org. If you are a national member, then you will already have an ID number. Local CSAAPT membership is separate but only a few dollars.

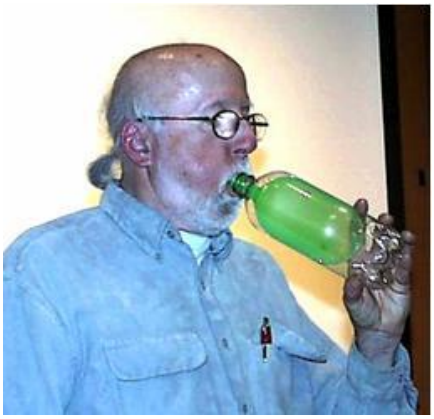
New faces: Sheldon Hewlett is new at Lincoln Park HS (near DePaul) and Dan Caldwell is at Northside College Prep Academy. Let's welcome them again at the Museum.

Our next Presenter was **Andy Morrison** from Northwestern University. He asked us **how we could use ice to boil water??** He proceeded to show us. He had a 1000ml Erlenmeyer flask in which about 150ml of water was boiling over a burner. He removed the flask and quickly sealed it with a rubber stopper (fitted with a valve). Then he placed the flask in a Styrofoam box having some ice at the bottom, and filled around the sides with more crushed ice. By going up and examining the apparatus, we saw that the water indeed was boiling, even though it was no longer at 100 degrees C! Do you know why? Andy explained that he used distilled water that was deionized and degassed, from his chemistry department. The steam drove out the air and when the ice was applied, the steam condensed leaving a partial vacuum. Boiling occurs when the vapor pressure of the water is the same as the pressure (partial vacuum) above it.

We had a discussion of safety and possible implosion of the flask. Suggestions included using a thicker boiling flask or a filtration flask which is intended for vacuum assisted filtration. Of course safety glasses and a plexiglass shield would further prevent accidents. What a NEAT demonstration!!

Our next presenter was **Colleen Moore** – an SPS undergrad at **NU**. She can be reached at NWU.SPS@gmail.com or if that doesn't work, try cmoore14@gmail .com. The SPS is will to give 60 minute presentations on physics to middle school students not too distant from Northwestern in Evanston. There is no charge. Contact her for details and available dates/times.

OUR host, **Art Schmidt,** brought out another piece of apparatus and showed us how a light projector (such as a slide projector) could be used to show thin film interference in a soap film. by reflection. He dipped a rectangular frame into a soap solution and positioned it so that light reflected from it, passed through a large lens and was focused on a screen. We saw horizontal stripes of cyan, magneta and yellow, the subtractive primaries. Art pointed out that the film had a thickness that varied from top to bottom because of the weight of the soapy water. Interference between the reflections from the front and rear surface of the bubble allowed one color to pass through and the others were reflected. For example, white minus transmitted blue produced a yellow reflection. The he proceeded to show us a low tech way of showing to a class and passing around the room. He took a plastic bottle and cap, in which a stopper-sized hole had been melted with a heated rod. A stopper plugged the hole and he poured in some soap solution, and wet the inside walls thoroughly. The he removed the cap and the stopper and blew a soap film to the center of the bottle. Then he recapped the bottle and plugged the hole. As he passed it around, we could see the interference colors by viewing the reflection of the ceiling lights in the film. Then he presented each of us with a prepared bottle, stopper, and a cap. This was the "free giveaway". If you didn't get one, try to make one from any clear plastic bottle with the label removed. Heat a rod the size of any stopper and melt a hole on the side near the bottom, inserting the stopper before the plastic hardens.



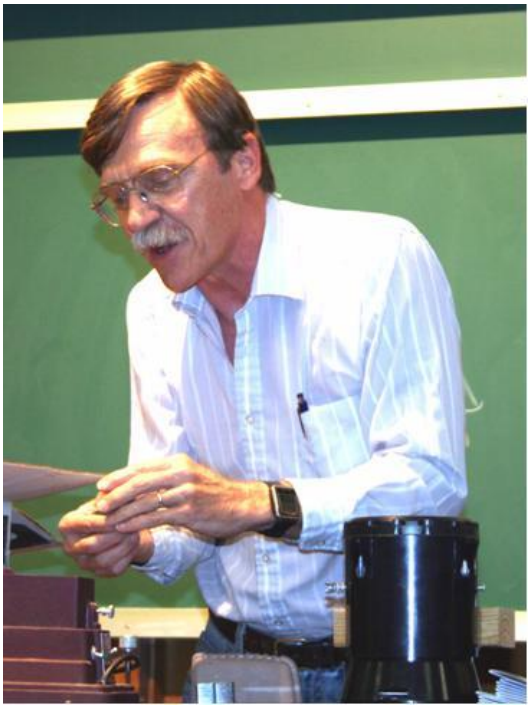
Then Art took two more bottles with balloons inside the bottle, stretched across the bottle top, as in the photo. He blew up the balloon and it stayed inflated even though the balloon mouth was open! He gave another bottle to someone and challenged him else to do it, but he couldn't. Art then revealed that his bottle had a hole in the side to allow the air to be pushed out by the balloon and when his finger closed the hole, the balloon remained inflated. The second bottle had no such hole to allow the air out.

Another use for the bottle (no hole) was to hold iron filings and place a magnet on the outside to see the patterns.

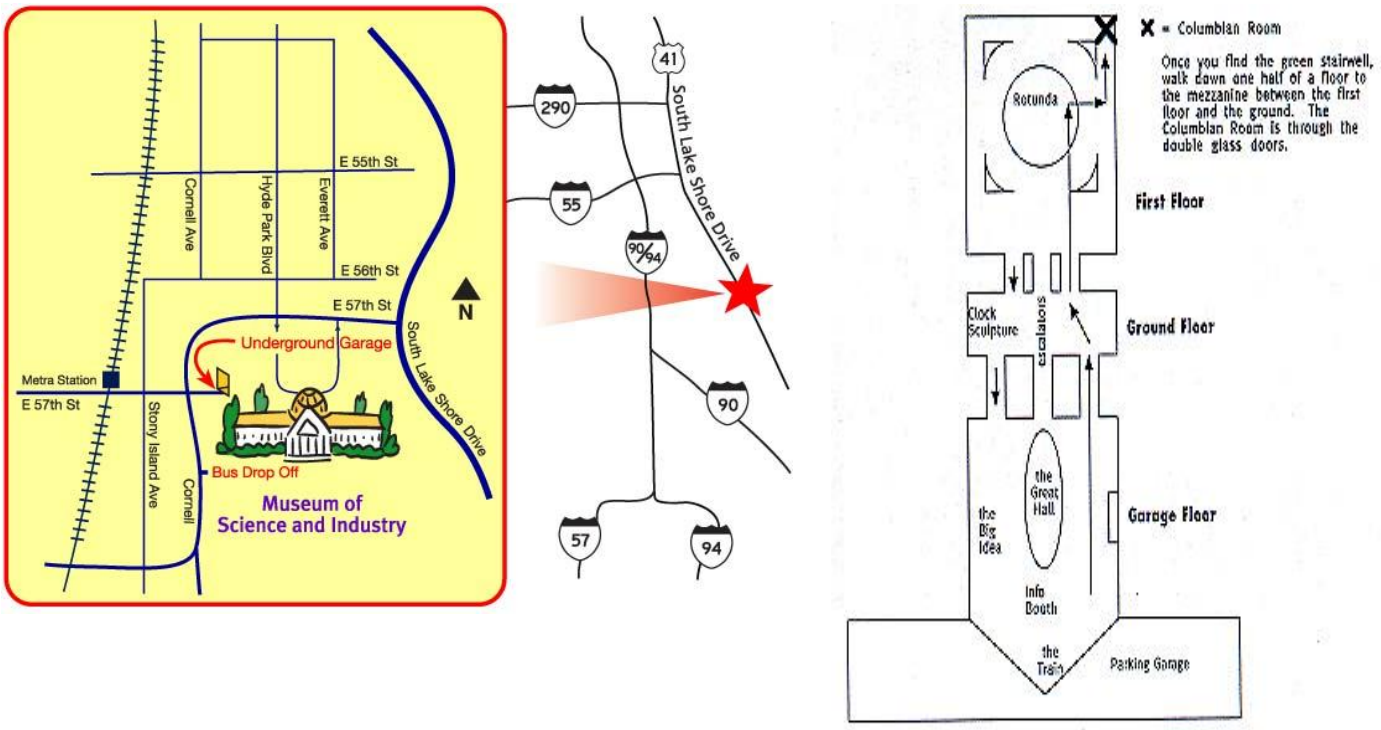
Next, **John Milton** of DePaul University showed us how to demonstrate the resolving power of the eye. He had a pattern of vertical stripes spaced by 2mm and one that had the same stripes horizontally oriented. He showed us that the average person could distinguish the direction of the stripes at a distance of 4 meters, not at greater distances. One can infer the angular resolution of the eye from this. observation. (Reference: http://stokes.byu.edu/resolve.html). John also brought a strong cylinder magnet and dropped it through an aluminum tube. The fall time was greatly reduced. We attributed this to the eddy currents produced but the complete explanation is not so simple. Several articles in AJP and TPT discuss this, even with a tube having a slot. But it does capture the interest of the students about Faraday's law of induction. Another neat idea to challenge the students. Ann Brandon pointed out that one ride at Great America uses magnetic damping to adjust the terminal velocity of a falling elevator**.** (References: AJP: May 2001, p 586; Feb 2002, p 103; Dec 1998, p 1066. TPT: Tom Rossing, March 1987, p 133).

Paul Dolan of NEIU brought up two corrugated tubes of slightly different lengths. He twirled them around his head and produced sound. Someone pointed out that the velocity of sound in these tubes is much different from that in free air, due to the corrugations. Then Paul swung two tubes and we could hear beats. Then he blew air from an air track supply through them and we could hear the beats more clearly... A very neat demo indeed.

Larry Alofs (left photo above) has been a mainstay of our meetings for more than 30 years, and is retired from Kenwood Academy .He brought a box of his teaching treasures to pass out to young teachers, to prepare for his move to western Michigan. We cannot express how much we will miss his friendship, insightful questions and suggestions. Thanks, Larry so much. We hope you'll be able to visit a meeting or two next year.



Reported by Gerry Lietz- retired from DePaul University.



From the north, head south on Lake Shore Drive and turn right onto 57th Street. Get in the left lane and follow 57th Street around to the Museum's west side. Turn left to enter the Museum's underground garage.
From the south, take I-94 west to 51st Street exit eastbound. Stay on 51st Street for approximately one mile and turn right into S. Hyde Park Blvd. Take S. Hyde Park Blvd south to 57th Street. You will be facing the Museum. Turn right on 57th Street and follow it around to the west side of the Museum. Turn left at the first light, onto the ramp down to the underground parking garage.
From the west, follow 290 East or 55 North to Lake Shore Drive. Go south on Lake Shore Drive. Exit right on 57th Drive. You'll need to be in the left-hand lane as you follow the curve around to the west side of the building and Cornell Drive. Turn left to enter the Museum's underground garage.
For more information or directions call the Museum directly at (773) 684-1414 or 1-800-GO-TO-MSI (1-800-468-6674), TDD call (773) 684-3323. Web link: www.msichicago.org

From downtown Chicago, there are several ways to reach the Museum **by bus**.
Take the #2 Hyde Park Express south to 57th and Stony Island and walk 1 block east to the Museum. (Runs during morning and evening rush hour.)
Take the #6 Jackson Park Express bus south to 56th Street and Hyde Park Boulevard and walk 1 block south to the Museum.
Take the #X28 Stony Island Express south to 56th and Hyde Park Boulevard and walk 1 block south to the Museum.

By **Metra** - Trains stop at the 57th Street station, just two blocks from the Museum's north entrance. Turn left as you exit the station. Chicago South Shore and South Bend trains only stop at the 57th Street station.