ISPP REMINDER **May 2011**

OUR NEXT MEETING…

…is at **Niles West High School**
Monday
May 9, 2011
6:30 – 9:30 p.m.

Scroll down for a map and directions.

Martha Lietz and her colleagues are sure to provide us with an evening of physics phun.

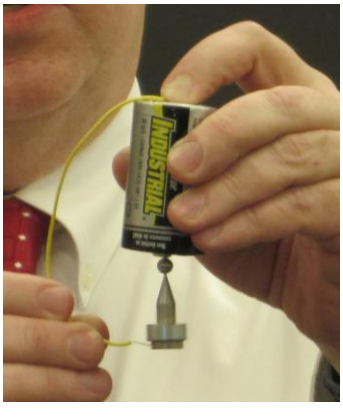
Future Meetings

June 7	(Tuesday)	MSI	Ruth Goehmann
July 30- August 3		AAPT Summer Meeting	Omaha, NE
October 27-29	(Thu-Sat)	CSDAAPT/ISAAPT?ISTA/IACT	Tinley Park

AT OUR LAST MEETING…

…April 12, at **Lake Forest College**, we were greeted by **Mike Kash** and his colleagues **Tom Senior** and **Amy Abe**. We were reminded of the next meeting date and location, as noted above.

Mike then showed us the evening's giveaway, a *homopolar motor*, consisting of a D-cell, one piece of wire, a rare earth magnet, a tapered steel piece and a ball bearing. As the picture shows, Mike held one end of the wire in contact with the positive terminal of the D-cell and brought the other end in contact with the magnet. We saw that the magnet, steel pin and ball bearing all rotated, due to the interaction between the field surrounding the currents in the wire, battery and magnet with the field of the magnet. Mike pointed out that no commutator is required for this motor. A big Earl Zwicker neat! for this one. Mike suggested that we look at a web site run by a Lake Forest physics alum: evilmadscientist.com.

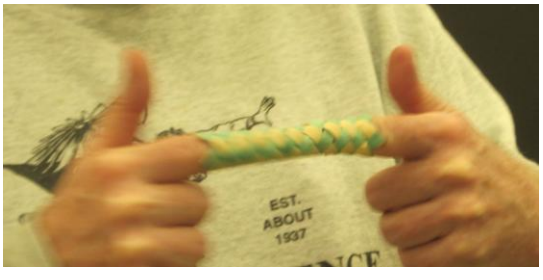


A new teacher bag was given to **Rich Vlach**, another Lake Forest alum (2003). He is certified in Illinois, currently seeking a teaching position (richvee21@hotmail.com).

Nicole Walker (Plainfield High School Central) is the recipient of this year's **Harald Jensen award**, as announced at the January meeting.

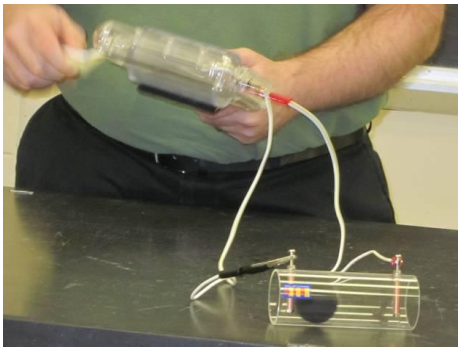
Paul Dolan (Northeastern Illinois University) showed us a device he obtained at Walgreen's, a "Try Me" back massager. Paul gave us copies of a note he published in *The Physics Teacher* (April 2011, p 249) where he describes the motion he observed: "When placed with its three feet on a table, it oscillates and also tends to jump up and down and rotate." We saw the rotational motion (but not the jumping) and Paul then hung it from a pair of strings; it did not rotate. We agreed that some sort of offset motor arrangement was the source of the rotation. Paul asked: "What can this be used for, besides back massage?" Then he brought out a "RoboStir," mechanical food stirrer he obtained from a TV ad. It rotated in the same fashion as the "Try Me" and we agreed that the rotation is probably due to the same kind of motor offset arrangement.

Nickey Walker showed us a number of talking toys: a cup and string chicken clucker (for waking up inattentive students), a talking Barbie doll, and a hummer – a wing-like piece of card that "hums" when hung from a string and rotated. She asks students to discuss the factors that determine the frequency of the hum. Then she brought out a couple of vinyl records. She describes how the master recordings were made and how the vinyl copies were produced. She demonstrated a "player" she made out of cardboard, a metal needle holder and a 78 rpm needle. Very impressive!



Pete Insley (Columbia College) gave us "finger traps" and some data he collected with them. When the traps are compressed the length decreases and the cross-sectional diameter increases. When they are expanded the length increases and diameter decreases. But the total area is (nearly) constant. Pete suggested asking to students to do the length and diameter or circumference measurements – would they measure diameter directly with a ruler or indirectly by measuring circumference with a string? They could look at class data to get averages and standard deviations and calculate percent differences between their values and the averages, and investigate the features of a bell curve. It was suggested that the areas might differ a little in part because the spacing of the elements of the trap changes when it is stretched or compressed.

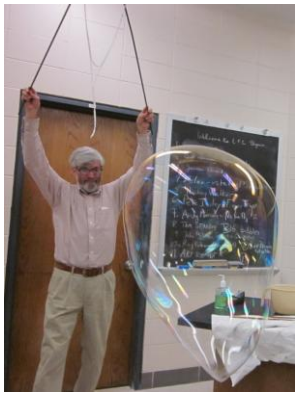
Andy Morrison (De Paul University) connected what he called a hand held Van de Graaff generator, sold by Nada Scientific as a Static Genecon (http://nadascientific.com/genecon_home $299 plus accessories at additional cost). He connected the device to an acrylic tube with conducting posts at the ends and a conducting ping pong ball between the posts. When he cranked the device the ball oscillated between the posts. He has used this when teaching about static electricity. In lab about static charges he had a Van de Graaff and the Genecon available for students to look at. He



pointed out that the Genecon is made of transparent plastic and it produces both signs of charge, so its operation can be compared to the Van de Graaff, which produces only charge of one sign. Next, he showed us a Fun Fly Science Stick (Arbor Scientific, $29.95, http://www.arborsci.com/prod-Fun_Fly_Stick_Science_Kit-1480.aspx). We have seen this before and were reminded that it is a small Van de Graaff generator. He got his from American Science and Surplus and it no longer works. The rubber band is not broken. We could not agree about the nature of the malfunction.

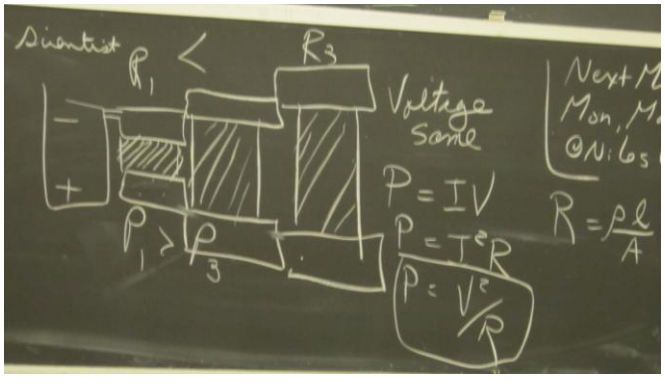
John Milton (De Paul University, retired) told us that Dave Vernier gave a set of instructions for turning the Vernier LabPro into a function generator, using the voltage probe that comes with the LabPro. These instructions are posted as a Power Point on the ISPP web site (http://ispp.slinkset.com/). The generator can produce triangular, square or sine waves from 0.5 to 166 Hz in 0.5 Hz steps, with maximum amplitude of 4 volts. John has used it to show students the operation of a speaker using a 1 Hz square wave – the in and out motion of the speaker diaphragm is easily seen. Two speakers can be connected to produce an audible interference pattern. At 166 Hz the wavelength is about 2 meters, so the speakers must be placed quite far apart to observe several nodal and antinodal lines.

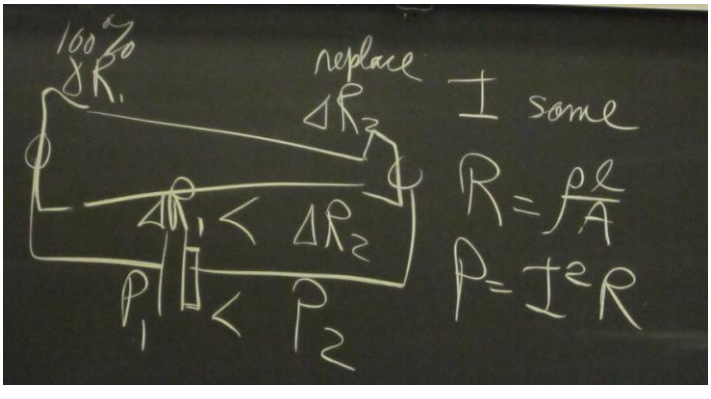
Tom Senior showed us video clips of VERY large soap bubbles (see "giant bubbles" on You Tube). He pointed out features of the thin film interference colors. His handout included a link to the Soap Bubble Fanciers WIKI, a formula for making bubbles, and an offer to supply one of the ingredients (Hydroxyethyl cellulose), mixed with baking soda and citric acid, for one dollar. He then proceeded to demonstrate the formation of these bubbles, using a stick and string frame called a "tri-string". (tomseniorphysics@yahoo.com)



Roy Coleman gave us a You Tube link, Squishy Circuits, he had been sent by our friend **Earl Zwicker** http://www.youtube.com/watch?v=5M3Dow20KlM. The narrator, AnnMarie Thomas, gives recepies for two different kinds of play dough. One recipe includes salt and the result is an electrical conductor, the other includes sugar and is an insulator. She argues that using these two materials, one can teach electric circuit basics very effectively to students at the 6th grade level, and she demonstrates play dough combinations to form series and parallel circuits for lighting LEDs and even powering a small DC motor.

Art Schmidt (Northwestern University) discussed the use of a small battery checker. He took one apart and saw that there were several liquid crystal strips wired in parallel. He then analyzed the power (and therefore temperature) distribution in the parallel elements and showed the voltage dependence. He also looked at a battery that had a built in voltage checker. It was a single tapered liquid crystal strip, with another kind of power and temperature dependence. In both cases the color displayed relates to the voltage. Art illustrated the color-temperature relationship of a liquid crystal sheet by dropping an object on a piece of wood, then laid the sheet on the wood to show how the impact point heated up.



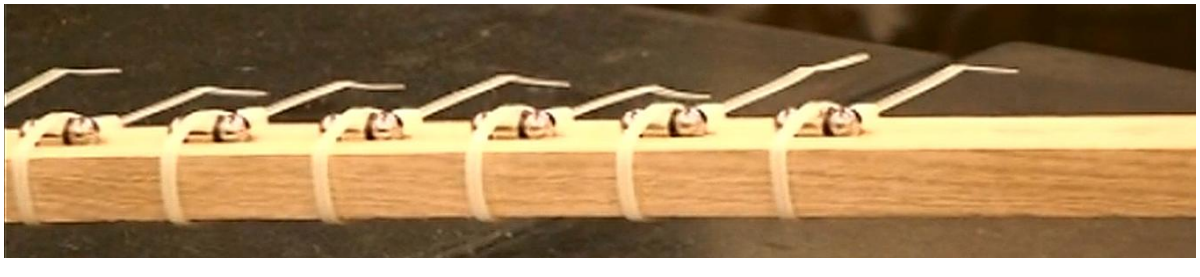


Ann Brandon gave us three pages from a book she likes: One Hundred Essential Things You Didn't Know *You Didn't Know* – Math Explains Your World, by John D. Barrow. The excerpt, from Chapter 48, tries to explain light reflection from pairs of plane mirrors. But, Ann showed, the explanation is incorrect. A plane mirror image is not reversed top to bottom or left to right, but back to front. She gave us a copy of a letter she sent to the author explaining this multiple mirror reflection in some detail. Ann also discussed – and demonstrated – some typical student problems regarding images seen in half height mirrors.

Martin Melhus (Northwestern University) set up a grooved wooden track with a series of neodymium alloy magnets held in place by cable ties. Two small steel balls were attached to each magnet. He pointed out that the ball closer to a magnet was in a higher energy state because it was closer to the magnet. A "launch" is made by giving another ball a push up the track with sufficient speed to transfer enough energy via a shock wave through the magnet to the second ball so that it is attracted to the next magnet and accelerated. This chain process continues and the final ball in the chain acquires a very large speed. In Martin's example the last ball was launched clear across the room. The balls end up in a lower energy configuration with a ball on each side of each magnet. He discussed some questions that might be asked regarding materials, launch angle, number of balls at each place, when does the acceleration take place, what does the energy curve look like, etc.

Before

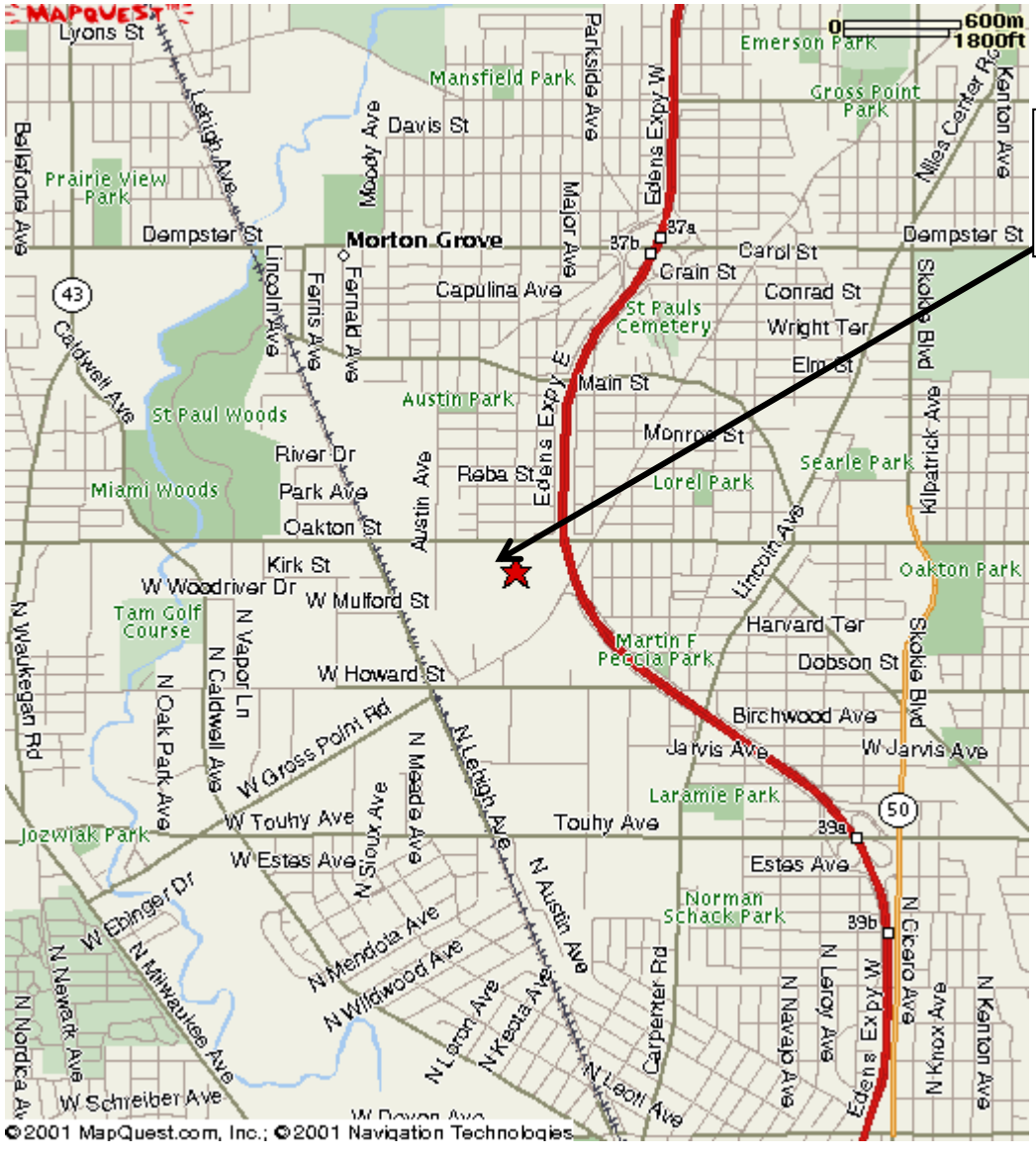
After



We departed after this last presentation with thanks to our Lake Forest hosts for physics phun phillled meeting. Come to Niles West – bring friends – bring physics.

Reported by John Milton

Map to Niles West High School



Directions:

<u>From North or South</u>: Take I-94 to Dempster Street, exit going east. Go to the second light stop light (Gross Point Rd.) and turn right. Take Gross Point Road south to Oakton, and turn right onto Oakton. The entrance to the school is the first left after the bridge over the highway**. Due to school security, you must enter through the auditorium entrance in front of the building. Signs will guide you to the appropriate room(s).**

<u>From West</u>: Take Dempster east from I-294 past Milwaukee Ave, past Waukegan Ave. to Austin Ave. Turn right. Take Austin south to Oakton. Turn left. Take Oakton east to the high school, and follow the directions above.